Conflicting Temporalities and the Ecomodernist Vision of Rewilding

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Abstract Ecomodernism offers a progressive and humanist vision of the Anthropocene, one in which publicly funded innovation has made possible both universal prosperity and planetary-scale rewilding. However, given the present primitive state of technology, ecomodernism is surely guilty of fabulism as its realisation would depend on technologies that may not be available for many decades. Despite this, ecomodernists argue that there is an overriding moral imperative to accelerate the transition to a fully integrated high-energy planet even if this accentuates the short-term need for solar radiation management. The aim of this chapter is to review the debate between ecomodernists and traditional environmentalists in relation to these conflicting temporalities. It is suggested that science may be of surprisingly little help in settling the underlying macro-political disputes.

Introduction

Considering how far we have come as a species over the last two or three hundred years, it would be very sad if the journey would end here. Or if the rest of the journey would be only for the few, leaving behind a planet that has been made largely unrecognisable and uninhabitable. It is thus not surprising that the natural impulse is one of scaling back (Crist 2018), to think that there is a way of unmaking modernity and harmonising society with non-human nature. According to ecomodernism (Asafu-Adjaye et al. 2015), that impulse, however, is fundamentally misguided. As a progressive and humanist vision of the future, ecomodernism instead suggests that only by doubling down on an Enlightenment trajectory of democratically guided scientific progress will it be possible to meet global human needs while restoring an ecologically vibrant planet (Symons 2019).

Essentially, the ecomodernist vision is about reaffirming pluralism, about envisioning an open-ended democratic future where some can be punk rockers and others stockbrokers, where people can live different lives and where the human condition...
can remain as contradictory and confusing as ever. Whereas traditional environmentalism seeks to impose a singular ethic of sustainability (Crist 2020), ecomodernism is cautioned by historical attempts to ensure ethical homogeneity and social purity. Rather than to fundamentally remake or rewire humanity, the ecomodernist vision seeks to reconcile the broad emancipatory forces of the last centuries with the natural environment through publicly funded breakthrough innovation. Yet, given the current primitive state of technology, ecomodernism is here surely guilty of fabulism and its optimism about the future may appear “not just self-delusional but outright dangerous” (Arias-Maldonado 2018, p. 139).

To make any sense, ecomodernist optimism has to be looked upon from the vantage point of the deep future, when technology exists to freely manipulate matter at the molecular level (Umbrello and Baum 2018), rendering both the production and transportation of material goods unnecessary and when abundant energy has not only overcome practically all forms of environmental determinism but also made possible climate restoration (Dorr 2016). Fantastic or even unrealistic as such a future may seem, ecomodernism is premised on the view that the relative distance from where humanity is today to that future is far shorter than the distance to anything remotely resembling “sustainability” as conceived by traditional environmentalism. In this, ecomodernism is in fact founded on a grim reading of current environmental trends which fully acknowledges the risk of catastrophic climate change (Pereira and Viola 2018). If long-term sustainability could be achieved by, say, a twenty or thirty percent reduction in economic activity, then “degrowth” would be the obvious and preferable response (Kallis et al. 2018). However, in a world of almost eight billion people, the level of depopulation and economic contraction needed is so great that it would be politically and socially unfathomable, especially in the light of competing national interests and widely shared material aspirations as the world desperately seeks to bounce back from the SARS-CoV-2 epidemic.

As such, rather than seeing a more integrated world as a threat to sustainability (Myers and Kent 2003) and erecting new barriers to migration (Cafaro and Staples 2009), ecomodernism takes the opposite view, that only in an open world of equalised opportunities will it be possible to summon the political momentum necessary for effective environmental action and avoid the kind of costly distractions over migration policy that has nearly derailed liberal democracy itself in recent years. Captured in the metaphor of a “high-energy planet” (Karlsson 2018), ecomodernism seeks to fully eschew Malthusian reductionism and its polarising demand-side framing of environmental problems and replace it with a unifying commitment to a supply-side energy revolution (Shellenberger et al. 2008). Yet, it is clear from the onset that there is a considerable temporal distance between the present and the hypothetical fruits

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1While obviously diverse, “traditional environmentalism” is here used to denote the widely shared belief that human societies must harmonise with nature in order to avoid economic and ecological collapse. Specifically, Thomas Princen writes that “if there were a single philosophical position in environmental thought, adhered by all who are concerned about environmental destruction, it is that at the root of that destruction is human’s separation from nature” (Princen 2010, p. 82). Ecomodernism differs from traditional environmentalism in that it rejects this analysis and instead advocates further “trophic detachment” (see Quilley 2011).
of that revolution. In the meantime, any attempt to take global development seriously would lead to further emissions overshoot and accentuate the need for controversial forms of climate engineering.

The aim of this contribution is to problematise these conflicting temporalities and, in particular, their implications for non-human nature. However, prior to that, the terms of the debate between ecomodernists and traditional environmentalists are reviewed with an emphasis on the controversy surrounding nuclear energy. On this basis, it is then argued that science is of surprisingly little help when it comes to settling these macro-political disputes or even for determining what should count as empirical evidence of failure and success, respectively. The chapter concludes by suggesting that, as the environmental crisis worsens, the stakes in these debates are likely to rise further yet, with both nuclear energy and proposals for climate engineering taking centre stage.

The Terms of the Debate

With regard to non-human nature, ecomodernism represents a philosophical shift from the management of nature to the liberation of nature (Symons and Karlsson 2018). In the very long run, ecomodernism envisions a comprehensive decoupling of the economy from the environment, either through atomically precise manufacturing or large-scale space colonisation. In the meantime, ecomodernists propose a gradual substitution of natural products with synthetic ones and the use of agricultural intensification in order to spare marginal lands. In essence, while traditional environmentalism seeks to re-embed society in nature, ecomodernism advocates greater separation as a pathway to planetary-scale rewilding. Among its critics, this idea has been misunderstood as some kind of opposition to family farms or wilderness hikes whereas it is rather about minimising large-scale interventions in nature, such as those caused by mining, forestry or energy production. Similarly, other critics have suggested that ecomodernists “celebrate the end of nature” (Fremaux and Barry 2019, p. 10) when a more open-minded reading of ecomodernist texts would make it clear that what is driving the ecomodernist project in the first place is precisely a moral concern for non-human nature and a desire to end human domination.

Beyond such elementary misunderstandings, ecomodernists diverge from traditional environmentalists in how they understand the broader cosmic setting of the human enterprise. Early pioneers of what is today known as ecomodernism, such as

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2For the purpose of this chapter, I have used The Ecomodernist Manifesto from 2015 as the primary source of what ecomodernism entails (Asafu-Adjaye et al. 2015). The manifesto was an effort to forge a consensus position among 18 leading ecomodernist thinkers. This means that I do not specifically engage with post-ecological perspectives but rather build on the seminal work of Martin Lewis (1992) with regards to the politics of non-human nature.

3For ecomodernists, rewilding is a future-oriented process by which land is returned to nature, and the degree of human intervention and management is reduced. For a broader conceptual discussion, see Gammon (2018).
the 2019 recipient of the “Breakthrough Paradigm Award”⁴ Stewart Brand, expressed a keen interest in space colonisation (Brand 1977; McCray 2013), a prospect that fundamentally alters the ethical context in which the ecological crisis is to be understood (Gott 1993, p. 319). Rather than accepting the subtractionist understanding of traditional environmental ethics in which the best would be for humanity not to exist, the possibility of humanity becoming a multi-planetary species and thereby securing not only its own long-term survival but that of life more generally, profoundly recasts the terms of the debate. Similarly, when taking an astrobiological perspective (Frank and Sullivan 2014), today’s changes in atmospheric chemistry become less of a final verdict on the moral failures of humanity and more of fairly predictable stumbling blocks on the road towards becoming a technologically mature civilisation.⁵

Introducing such alternative end-points also makes it far more difficult to determine what is actually promoting versus impeding sustainability in the present. For instance, “luxury” emissions from aviation may turn out to be essential for driving aerospace innovation while demand for “unnecessary” consumer electronics may lay the foundation for the next revolution in electronics. All this brings back the argument over the relative distance towards a long-term sustainable socio-ecological regime, especially in the context of world politics with its deeply fractured epistemologies. Whereas a traditional vision of sustainability would always remain threatened by re-emerging unsustainable practices and its regime of ecological austerity would have to be policed indefinitely, the ecomodernist vision is about finding long-term solutions that are inherently compatible with the “broken timber of humanity”, to speak with Immanuel Kant. Instead of rationing the consumption of individual natural resources at the local level, ecomodernism sees the wise use of resources as a stepping-stone to a global post-scarcity future in which resource extraction has either become unnecessary due to atomically precise manufacturing or can take place outside the biosphere. While probably not entirely historically accurate (York 2017), ecomodernists often use the example of whale oil to illustrate this point about the transformative role of technology and how, instead of politically determining what would be a sustainable rate of whaling or trying to “correctly” price the ecological services provided by whales as suggested by neoliberal conservationism (Büscher et al. 2014), technological innovation ultimately rendered whale oil obsolete as a fuel. According to ecomodernists, the example of whale oil fits into a larger narrative which suggests that humans primarily spare nature for which they have little practical use (Blomqvist et al. 2015) and, as such, the path to ecological flourishing does not go through better valuing nature in monetary terms but instead through technological innovation that makes nature less economically valuable. Ecomodernists also note that, as societies become more affluent, post-materialist values tend to become more pronounced, and the ability to set aside land for conservation purposes increases.

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⁴The Breakthrough Paradigm Award is an annual prize offered by the Oakland-based ecomodernist think tank The Breakthrough Institute.

⁵For a generalised discussion on the possible implications of technological transformation and astronomical trajectories, see Baum et al. (2019).
Ecomodernist criticism of traditional environmentalism often comes down to debates over scale. For instance, while residential photovoltaics may be sufficient for powering household appliances or charging personal electronics and thus give an optical illusion of decarbonisation, that says very little about the energy needed to build the house in the first place or the energy embodied in the different consumer products. This is why the concept of “Energy Return on Investment” or EROI has become crucial for ecomodernist thinking as it engages with the question of what technologies could facilitate a rapid global decarbonisation (Karlsson and Symons 2015). Reviewing historical emission trends and to what extent alternative energy sources have actually succeeded in displacing fossil fuels (Cao et al. 2016; Loftus et al. 2015; York 2012), it is worth noting that sustained reductions that would be proportionally commensurate with the targets of the Paris Agreement have so far only come from two sources, either from severe economic contraction as in the wake of the SARS-CoV-2 epidemic (Le Quéré et al. 2020) or the deployment of nuclear energy. Calculations suggest that if the rest of the world would be able to replicate the build-out of nuclear energy in Sweden and other leading countries in the 1970s, fossil-fuel electricity worldwide could be displaced within a couple of decades (Qvist and Brook 2015). In contrast, and despite a much publicised effort, the German “Energiewende” based on renewable energy has not led to any significant decarbonisation as emissions have stayed roughly flat since its inception in 2011, prompting the German government to admit that it will miss its 2020 climate target. The intermittent nature of renewable energy sources means that they depend on fossil fuels for load-balancing while their low EROI (which becomes even lower in case batteries are used for load-balancing) makes them incapable of doing the heavy lifting needed to decarbonise the global economy as a whole (Moriarty and Honnery 2016). Often discussions over these issues tend to get stuck over particular technical details or price estimations that are taken out of context. For instance, it is not uncommon for authors who advocate for a post-capitalist future to dismiss nuclear energy on the basis that it is “too expensive” (Nisbet 2014), which, after all, is a rather odd concern since the EROI of an all-renewable energy systems would be “well below the range of the thresholds identified in the literature as necessary to sustain high levels of development in current industrial and complex societies” (Capellán-Pérez et al. 2019, p. 18). Important as these controversies may be, they ultimately reflect different orientations towards the Enlightenment and debates that go back all the way to the making of modernity (McMahon 2001).

For ecomodernists, access to clean and abundant energy is essential to eradicate poverty through transformative social change and comprehensive modernisation (Bazilian and Pielke 2013). With regard to nature, a high-energy future is seen as equally crucial for protecting biodiversity and avoiding the kind of energy sprawl associated with renewable energy sources (Trainor et al. 2016). More specifically, ecomodernists point to how mass desalination of seawater for agriculture can spare natural aquifers and how direct air capture of carbon dioxide can restore atmospheric concentrations to pre-industrial levels (Keith et al. 2006). On their end, traditional environmentalists believe that the planet cannot sustain such energy levels (Moriarty and Honnery 2009) and that there is an urgent ethical need for an “energy descent”
in order to “unlearn abundance” (Alexander and Gleeson 2019). Again, these are not so much technical debates as they are conflicts between different worldviews and ways of understanding the human condition.

Whereas traditional environmentalists often believe that the future will be marked by crisis and energy scarcity (Friedrichs 2013) and that community resilience can be strengthened by relocalising the economy and adopting “low-tech” options (Alexander and Yacoumis 2018), ecomodernists fear that such an outlook may quickly become self-fulfilling. Instead of “reshoring” and retreating from the global, ecomodernists see international trade as instrumental for overcoming local scarcity and ensuring food security in times of extreme weather events (Karlsson 2017). In this, ecomodernists point to the need for a progressive and coherent theory of globalisation, one that can equalise opportunity and, to quote the mission statement of the Breakthrough Institute, “accelerate the transition to a future where all the world’s inhabitants can enjoy secure, free, prosperous and fulfilling lives”. More than anything, it is this commitment to global equality of opportunity that sets ecomodernism apart from existing theories of sustainable development but also mainstream political debate which often rests on the silent assumption that universal prosperity is simply ecologically impossible. Historically, the construction of modern welfare states has depended on the creation of high-productive off-farm jobs and rapidly rising energy consumption. Ecomodernists see no compelling reason why the developing world should not be allowed to follow a similar trajectory and that, rather than making climate mitigation contingent on the poor never “catching up”, ecomodernists argue that global economic convergence should be the natural starting point for all climate mitigation strategies.

One of the most tired tropes of ecological economics is that “infinite growth is not possible on a finite planet”. Obviously, in an open universe, that truism becomes slightly less convincing (Bostrom 2003). The problem, however, is how to make the transition from where humanity is today to a prosperous, post-scarcity future in which technology has advanced sufficiently to overcome environmental determinism. Beyond the fictional accounts of StarTrek, few attempts have been made to articulate what such a future would even look like. In a post-utopian political landscape deprived of political imagination, visions of a bright multi-planetary future are readily dismissed as hopelessly naïve or hubristic. Part of this dismissal has to do with declining trust in our capacity for collective action. Whereas the same lack of purpose and direction has clearly not befallen the enemies of the Enlightenment (Lilla 2016), the political Left has long abandoned the Promethean imagination that used to be one of its defining characteristics (Meyer 2016).

How can the temporal gulf that separates a worsening ecological crisis in the present from a future of ecological restoration and rewilding be bridged? Ecomodernists generally agree that the state is the only actor with both the political legitimacy and institutional capacity to facilitate the necessary acceleration of science and technology (Symons 2019). However, in the present, there is no constituency

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6For a recent such attempt which, if nothing else, has received considerable traction in social media, see Bastani (2019).
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that demands such innovation efforts. Instead, much of the climate debate remains trapped around personal emissions reductions and the relative morality of this or that lifestyle. Similarly, as witnessed most recently at COP24 in Katowice, there is no serious discussion about the energy needs of a universally developed world (Arto et al. 2016) or to what extent the actions undertaken by the most ambitious countries are actually possible for others to replicate (or if their perceived success depends on the offshoring of energy-intensive industries to developing countries). In fact, even accounts that specifically engage with the offshoring of emissions through trade tend to remain focused on how to reduce consumption in rich countries rather than how to make production less polluting everywhere. For lack of a better description, the inability to take global scalability issues seriously represents a form of “climate nationalism” that ecomodernists believe distorts the standards by which progress towards the goal of climate stabilisation is measured (Karlsson and Symons 2015). One flashpoint in this debate has to do with the use of energy forestry which, although perhaps useful for reducing emissions in rich and sparsely populated countries in the Global North, would have far-reaching consequences for biodiversity and food production if used in the tropics (Pimentel et al. 2009). A similar argument can be made surrounding the use of large-scale hydropower which depends on the existence of a finite number of fast-flowing and dammable rivers. As such, even if countries like Iceland or Costa Rica may appear to be “climate leaders” with nearly 100% of their electricity supply coming from low-carbon sources, that leadership is dependent on unique geographical features that other countries do not possess. This helps to explain why ecomodernists so wholeheartedly have come to see breakthrough innovation as the only way that the burgeoning energy demand of the developing world can be reconciled with the need for effective climate action (Green 2017). However, such innovation efforts will not happen as long as it is commonly believed that existing renewable energy sources are sufficient to fight climate change or if the richest and most motivated countries were to succeed in partially decarbonising their economies using non-scalable technologies. It is thus not surprising that one of the most heated exchanges between ecomodernists and traditional environmentalists has concerned precisely the feasibility of a 100% renewable energy future (Clack et al. 2017) and the question of what technological pathways that are most suitable for facilitating a deep decarbonisation (Jenkins et al. 2018).

Love Your Monsters

Writing in *Breakthrough Journal*, the French sociologist Bruno Latour argued that, rather than running away in panic from the world that it has created, humanity needs to learn to “love its monsters”:

But our sin is not that we created technologies but that we failed to love and care for them. It is as if we decided that we were unable to follow through with the education of our children … The dream of emancipation has not turned into a nightmare. It was simply too limited: it excluded nonhumans. It did not care about unexpected consequences; it was unable to
follow through with its responsibilities; it entertained a wholly unrealistic notion of what science and technology had to offer (Latour 2011, p. 22, 28).

No monster is more emblematic of modernity than nuclear energy. Despite that civilian nuclear power has historically saved close to two million lives and prevented 60 gigatonnes of carbon emissions (Kharecha and Hansen 2013), traditional environmentalists typically see it as an undemocratic and ungovernable “mega-technology” (Barry 2016) which only serves to reinforce the hubristic separation from non-human nature that they believe is the root cause of the ecological crisis (Princen 2010, p. 82). In contrast, ecomodernists point to the experience of Sweden in particular to show that not only is a high-nuclear pathway eminently compatible with democracy but also capable of producing unparalleled ecological benefits (Goldstein and Qvist 2019; Pierrehumbert 2016). Turning the separation argument around, ecomodernists see the relative “disembeddedness” of nuclear energy as one of its principal merits as its high density allows for the production of massive amounts of clean and dispatchable electricity without the need for the kind of large-scale interventions in nature associated with biomass and renewable energy sources. For these reasons, nuclear energy has become increasingly central to the ecomodernist agenda as a way of ending human domination and making room for rewilding, especially in a future with greater global equality.

While there may be some truth to the suggestion that if nuclear energy was discovered today, it would immediately be recognised as the solution to climate change, existing nuclear technologies come with the long shadow of the Cold War and are held to standards that are very different from those of fossil or renewable energy sources. While next generation nuclear technologies capable of safely recycling existing nuclear waste and eliminating the need for further uranium mining may assuage some of those concerns (Brook et al. 2015), nuclear energy still has a profound cultural problem as embracing it also means making peace with the masculinity, artificiality and hyper-rationalism associated with the Enlightenment. It is important to recognise how secondary “hard” scientific data is to such cultural concerns. Just as the suburban university professor who takes her Mini Cooper to the Farmers’ Market and Instagrams organic produce is seen as a trailblazer of sustainability while the effective altruist in his high-rise eating Soylent is seen as hopelessly estranged from nature, the perceived unnaturalness of nuclear energy puts it at odds with prevailing cultural logics and risk perceptions. Similarly, while few people would probably give much thought about biking, many people have intense anxieties about flying even as all “scientific” risk assessments show that flying is infinitely safer.

The democratic use of nuclear energy depends on the existence of a high-trust society and strong professional ethics among those set to regulate it. As such, it is not particularly surprising that small-scale renewable energy sources, even if dependent on the mining of rare earth minerals and a large component of natural gas in order to provide energy when the wind does not blow or the sun does not shine, are seen as a

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7The surface footprint of nuclear power is around 2 km²/GWe compared to 50 km²/GWe for photovoltaics, 300 km²/GWe for wind turbines and 2500 km²/GWe for biomass (Berger et al. 2017, p. 65). Note that the footprint of wind and solar is even higher if intermittency is accounted for.
safer bet, especially as overall trust in public institutions is declining. However, in the same way, that meaningful social resilience does not come from encouraging individuals to become “preppers” but from strengthening our collective institutions in order to prevent collapse in the first place, ecomodernists see a high-energy future as a way of going all in with regard to globalisation and ensuring that people everywhere have the clean energy needed for comprehensive modernisation. By making fossil and renewable energy sources uncompetitive, ecomodernists also hope that climate risks can be reduced while non-human nature and habitats can be spared. However, for many people in the OECD, the vision of an ecomodernist high-energy future does not resonate with everyday experiences. By most standards, a rich country like Norway is already fairly “sustainable” with a stable baseload supply from hydropower. The problem only arises once one imagines that everyone in a world of 8–10 billion people has a right to live in a similar fashion. While the answer from traditional environmentalism has been that this is simply not ecologically possible and that people in the rich countries have to dramatically reduce their energy consumption in order to accommodate developing world growth, ecomodernists believe that proposing such reductions would trigger a strong anti-environmental populist response and that they, equally important, would end up foreclosing humanity’s long-term possibilities as a species (Karlsson 2016). Essentially, ecomodernists suggest that effective climate policies need to work with, rather than against, the transformative forces of the last centuries in order to lessen international inequalities and reduce the risk that developing countries become trapped in a state of premature deindustrialisation due to the lack of reliable energy (Rodrik 2016).

Meanwhile, traditional environmentalists have spared no energy in stoking polarisation and attacking what they consider to be a malign global elite (Klein 2014). In their view, climate change is a moral issue akin to apartheid, and their tactics of visual boycotts and divestment protests also reflect this analysis (Mann and Wainwright 2017, p. 173). Yet, as long as human development remains closely linked to rising carbon emissions, it seems reasonable to doubt the possible success of such tactics. Ecomodernists on their behalf believe that it is crucial to instead restore elite interest in public affairs and reduce overall political polarisation. The Breakthrough Institute in particular has sought to invite conservatives to its dialogue events in the hope of overcoming some of the deadlock surrounding climate policy in the United States. Still, ecomodernist insistence on the role of government in driving innovation inevitably puts it at odds with the dismantling and paralysation of the state that has followed in the wake of the Trump presidency.

Given its progressive and cosmopolitan orientation, ecomodernism is naturally opposed to ethno-nationalist populism but also postliberal visions of ecological austerity. However, in order to offer a coherent alternative to both these ascending forces, ecomodernism in its turn becomes dependent on an emancipatory or even utopian imagination whose realism can only be evaluated ex-post. Far from being some passive belief in capitalism’s capacity to deliver a “techno-fix”, ecomodernism argues that a politics of radical engagement and broad social investments are necessary to facilitate a sufficient advancement of science and technology. In a recent intervention, one of the founders of the Breakthrough Institute, Ted Nordhaus, pointed
out that whereas the most successful clean energy initiatives in modern history have all followed a state-led model, most environmentalists today have come to shun big centralised infrastructure and remain captive to a deregulatory neoliberal imaginary in which fossil fuel subsidies and powerful corporate interests are the only things holding back a rapid adoption of renewable energy (Nordhaus 2019). Rejecting this analysis, ecomodernists argue that the innovation of radically new technologies, rather than the deployment of existing ones, must be at the heart of any effective political response to the Anthropocene. In his book-length treatment of ecomodernism, Jonathan Symons writes, “[s]ince the technological metabolism of contemporary civilization is ecocidal, we need an entirely new set of technologies for food production, transport, industry and electricity. Such rapid technological change will only happen if low-carbon innovation becomes a political priority” (2019: 110).

Learning in the Anthropocene

All of this again brings to the fore the temporal disconnect between the ecological stress generated by accelerated economic convergence in the present and the possibilities of ecological redemption in the future. To some extent, this disconnect echoes the older debate surrounding the existence of an Environmental Kuznets Curve (Dinda 2004). Yet, its scope is no longer confined to specific pollutants but pertains to the sustainability of the human enterprise written large.

Considering the current rate of habitat destruction, and rising global temperatures, there is little empirical support for the ecomodernist belief in decoupling of economic growth from environmental impacts. While it is true that demand for a range of natural resources seems to have peaked (McAfee 2019), and that a relative decoupling is occurring across numerous indicators, the absolute numbers are not encouraging (Wiedmann et al. 2015). Not only does global energy growth continue to outpace decarbonisation (Jackson et al. 2018), but as the oceans fill up with plastics, corals bleach and unprecedented wildfires take their toll, talk of a “Good Anthropocene” may come across as utterly tone-deaf.

Nevertheless, what is under debate is not whether humanity has historically been destructive to its natural environment (it has!) but what long-term planetary trajectory has the greatest chance of ultimately bringing about sustainability. Here, traditional environmentalism has an obvious advantage in that people can easily imagine that their environmental footprint would be smaller if they somehow “harmonised” with non-human nature (or, better yet, if they stopped existing). However, while the Na’vi in Avatar may make for excellent science fiction,8 the political pursuit of such a totalising vision of Ecotopia is unlikely to command broad democratic support any time soon. In a world as populous as ours, it is also worth noting that a disorderly “energy descent” would utterly destroy the biosphere as untrained people would go out in nature in search of food and fuel. Thus, it is not surprising that many

8The Na’vi is a species on the planet Pandora that embodies many of the ideals of deep ecology.
environmentalists stop far short of deep ecology, arguing that all that is needed is that we all tread a little bit lighter on the planet. However, science lends little support for such an incrementalist belief. According to the latest *Emissions Gap Report*, global net emissions would have to quickly fall back to the levels of the mid-1970s (around 25 GtCO$_2$e per year) to make possible even a 1.5 °C pathway (Olhoff and Christensen 2018), that is to a time when the global population stood at a mere four billion and neither China nor India were industrialised. Yet, by the same token, there is a little hope of climate stabilisation even if policies slightly more aligned with the ecomodernist vision were to be pursued by a handful of motivated countries.

Again, the problem is one of scale but also what visions (a) can offer scientifically feasible accounts of future socio-natural relations and (b) inspire decisive global action. Given that “radical strategies are called for on either side of the ideological divide” (Arias-Maldonado 2020, p. 12). According to ecomodernism, it is ethically unacceptable to try to solve the ecological crisis on the backs of the poor by denying them the right to a modern life. Instead, humanity must finally make good on the original promise of the Enlightenment and its universal humanism, even if this requires a large amount of proactionary risk-taking and temporarily escalating measures of unsustainability. In order not to only trigger ecological mayhem, such an acceleration would have to be matched by determined political action that would, in turn, require strong civil society advocacy. While some scholars are beginning to accept the ecomodernist view that neither energy efficiency improvements nor renewable energy will be sufficient in the fight against climate change, that does not necessarily translate into support for high-energy innovation but rather into even more radical calls for “deep” energy conservation (Moriarty and Honnery 2019, p. 12), degrowth and a future “defined primarily in terms of frugality, micro-scale localism [and] subsistence” (Trainer 2012, p. 594). What, if anything, in terms of empirical evidence and feedback, would be sufficient to break this impasse?

For long, traditional environmentalists have entertained the belief that humanity would somehow be “saved by disaster” and that, as the material effects of climate change would be felt, support for radical ecologism would grow. However, just as the financial crisis of 2008 did not lead to the demise of neoclassical economics but rather its entrenchment in the form of public austerity, it is equally possible that people will react to the threat of worsening storms by buying sturdier pickups or voting for politicians who promise to keep climate refugees out. Yet, the same problem of political mobilisation applies with equal force to ecomodernism. Of particular concern to ecomodernism is the risk that piecemeal improvements in energy efficiency, especially in combination with overall deindustrialisation, will further diminish rich countries’ interest in financing breakthrough supply-side innovation. As rich countries continue to pick the low-hanging fruit of such spontaneous decarbonisation (Pielke 2018), it is possible that they will experience sustained emissions reductions for many years, at least relative to GDP growth, and that this will obscure the fact that the core of their economies remains fundamentally carbon based. Similarly, if ecomodernists are correct that renewable energy is essentially a cul-de-sac with regard to climate change mitigation (Brook et al. 2018), it may still take decades to bring about a sufficient policy re-orientation given how invested many governments and NGOs have
become in their support for renewable energy and how insensitive they seem to be to evidence of policy failure (Germany here being a case in point).

Even if only one single death has been attributed to the radiation released after the Fukushima accident while millions die from the burning of fossil fuels every year (Landrigan et al. 2018), public opinion turned strongly against the use nuclear energy following the accident (Kim et al. 2013). This underscores the fragility of a nuclear-centred ecomodernist project. It is likely that a rushed build-out of nuclear energy in response to climate change would lead to accidents and possibly even fatalities. Even if a utilitarian calculation could be used to show how insignificant such local losses would be compared to the devastating global effects of unmitigated climate change, this presents a profound pedagogical problem.

The underlying cause of many of these difficulties is the lack of feedback across scale levels which makes learning in the Anthropocene, which is already inherently difficult due to cultural factors and ideologically motivated cognition (Kahan 2013), even more challenging. Stephen Gardiner famously talked about how the spatial and temporal dispersion of causes and effects invites moral corruption, prompting him to describe climate change as a “perfect moral storm” (Gardiner 2006). This obviously has profound implications for the prospects of an ideal or optimal response to climate change. One does not have to be a cynic to suspect that neither Ecotopia nor StarTrek is forthcoming any time soon (Karlsson 2013). If the time-scales were more compressed, the sense of urgency would presumably be greater. In his “Vulnerable World Hypothesis”, the philosopher Nick Bostrom explores a scenario in which the threat of climate change would be even more catastrophic than it actually is. In this scenario, a doubling of atmospheric CO2 would lead to rapid warming in the range of 15–20 °C rather than 3 °C (Bostrom 2018, p. 13). In such a “vulnerable world”, there would probably be much less hesitation about a war-time mobilisation to quickly build thousands of nuclear reactors in order to fully decarbonise the economy and capture CO2 from ambient air. However, even in our world, it is still reasonable to expect that increasingly radical policy options will become more salient in the public debate as the environmental crisis gradually worsens.

A common criticism of ecomodernism is that it is hubristic to believe that humanity can somehow detach itself from the natural world. That argument, however, rests on the unexamined premise that it is not hubristic to believe that humanity can remain entangled in fragile ecosystems that we have long outgrown, both in our numbers and resource use. As the seminal ecomodernist thinker Martin Lewis put it already in his 1993 article: “when one considers concrete issues regarding the provisioning of our basic material needs, the separation of the human economy from natural systems turns out to offer profound environmental benefits, while the continued immersion of our apparatus of production into the intricate webs of nature is itself highly threatening to the natural world of non-human species” (Lewis 1993, p. 779). In contrast, belief in traditional environmentalism comes with the assumption that humanity can somehow collectively lessen its appetite in an almost ant-like fashion. Historically, such totalising visions have not fared well. If ever realised, they are also likely to undermine the very material conditions that made lifestyle environmentalism and other forms of emancipatory self-expression possible in the
first place. A rematerialization of the economy and a return to labour-intensive forms of agriculture would presumably also be accompanied by a return to survivalist values and a greater emphasis on community self-reliance. On this topic, Stephen Quilley has written about the impossibility of “liberalism in one village” and the associated problem of violence in a degrowth world (Quilley 2011, p. 77), an issue that traditional environmentalism rarely if ever engages with.

**Ever Higher Stakes**

If an optimal and timely response to the climate crisis is not forthcoming, there are good reasons to believe that political attention will turn to Solar Radiation Management (SRM) or other forms of climate engineering (Heyward 2013). Theoretically, stratospheric aerosol injection of sulphate particles can offer “an escape route against strongly increasing temperatures” (Crutzen 2006, p. 216) should conventional mitigation efforts prove insufficient. While clearly no permanent solution, or a substitute for reducing atmospheric concentrations of greenhouse gases since it would not address ocean acidification, SRM would presumably “buy time” (Wigley 2006) for mitigation by stemming sea level rise and preventing possibly irreversible damages in terms of biodiversity (Long 2016), even as it would give rise to profound governance challenges (Reynolds 2019).

For ecomodernists, SRM represents a daunting predicament. On one hand, it is precisely the kind of risky large-scale intervention in nature that ecomodernism revolts against.9 In addition, the use of SRM would likely reduce the political urgency of developing new supply-side solutions such as next generation nuclear energy. On the other hand, considering the catastrophic ecological and human losses that SRM has the potential of averting as well as ecomodernism’s overriding commitment to human development, it would be unethical to reject SRM simply on the basis that it is “unnatural”, especially when considering how deeply entangled humanity already is in nature. As such, most ecomodernists probably agree with Joshua Horton and David Keith in that “given the very strong evidence that SRM would significantly reduce global temperatures and thereby limit climate impacts, particularly in the developing world, we view research on SRM as a moral imperative” (Horton and Keith 2016, p. 90). If nothing else, ecomodernists reckon that such research can be motivated on the basis of ensuring that false hopes are not tied to a technology that ultimately does not work.

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9These risks include the possibility of uneven side effects in terms of altered precipitation and evaporation levels. Similarly, once initiated, a SRM programme would presumably have to continue until concentrations of greenhouse gases in the atmosphere have been sufficiently reduced or there would be a sudden spike in temperature. This so-called “termination problem” (Rabitz 2018) has been much discussed in the literature but the fact that the lifetime of sulphur aerosols in the stratosphere is limited to one to two years could also be seen as beneficial as it makes a SRM programme essentially reversible.
It should not come as a surprise that traditional environmentalists have arrived at a very different analysis of the possible risks and benefits of SRM. Naomi Klein for instance explains how “geoengineering will certainly monsterize the planet as nothing experienced in human history” (2014: 279) whereas Clive Hamilton sees it as “the fulfilment of three and a half centuries of objectification of nature” (Hamilton 2013, p. 200). While environmental arguments against SRM are sometimes invoked, it is clear that the main line of criticism has to do with morality and politics (Anshelm and Hansson 2014). When Justin McBrien writes that “capital now seeks to postpone its demise through planetary geoengineering” (McBrian 2016, p. 135), it is easy to see how the insistence on absolute “system change” drives resistance to SRM and other forms of climate engineering. After all, if SRM can indeed reduce the risk of a climate catastrophe, it would also deprive traditional environmentalism of a key motivational vehicle for its politics.

If the world were to stay on its current path towards 3–5 °C of warming above pre-industrial levels, SRM may quickly emerge as a very real policy option given its short response time compared to emissions reductions (Van Vuuren and Stehfest 2013). If that were to happen, it is likely that an intense political struggle would ensue. With ever rising stakes, the macro-political disputes of the Anthropocene would probably become even harder to settle.

Similarly intractable, ecomodernism has given rise to a fierce debate over the role of intensification and industrial agriculture in land-sparing (Balmford et al. 2018). Echoing many of the arguments above, ecomodernists claim that urbanisation and higher yielding concentrated agriculture have the potential of freeing up land elsewhere for habitat restoration and rewilding (Blomqvist et al. 2015, p. 34). However, for this mechanism to actually deliver meaningful results in terms of conservation, there has to be a strong biophilic ethic in society that ensures that the land spared by intensified agriculture is in fact returned to nature and not converted into for instance energy forestry (as has been the case in much of Europe and the United States). In any case, it seems safe to say that until the hypothetical arrival of truly “game-changing” technologies in the field of synthetic biology or atomically precise manufacturing, the ecomodernist case surrounding agriculture appears comparatively weaker than the arguments advanced in relation to energy and climate. This is especially so when considering factory farming and the unethical treatment of non-human animals in general.

Conclusion

As the world approaches what James Martin once described as the “mid-century canyon” of increasing environmental stress (Martin 2007), there is an urgent need for grand-scale decisions. This chapter has outlined some of the ways in which an
ecomodernist vision of such decisions would differ from those of traditional environmentalism. Still, for all their apparent differences, these two visions of the future share some important characteristics, in particular, a highly idealist understanding of history and a belief in human exceptionalism (Mann 2018, p. 455). For ecomodernists, human exceptionalism calls for completing the emancipation from nature that began with the Enlightenment and realising humanity’s axiological potential along an astronomical trajectory in order to make possible planetary-scale rewilding. For traditional environmentalism, it means that humans, unlike any other species, can avoid extinction by collectively self-regulating their reproduction rate and resource use and thus restore a stable equilibrium in relation to its environment. In political terms, ecomodernism promises a democratic and pluralist future characterised by ever greater measures of fluidity whereas traditional environmentalism seeks to restore a common sense of belonging and permanence at the local level.

However, one does not have to look further than the Trump presidency or the SARS-CoV-2 epidemic to realise that the real world does not unfold according to these kinds of ideal types. Often, inertia and irrationality but also sudden urgency seem as important as ideas and visions. Regardless, the twenty-first century does not bode well for non-human nature. Both ecomodernists and traditional environmentalists probably agree that things will get significantly worse before they get any better. As the state of non-human nature continues to deteriorate, all sides will look for empirical evidence to support their respective arguments, including counter-factual arguments about what the world would have looked like if people had only listened to them. However, given the difficulties in agreeing on an appropriate unit of analysis or baseline, science will remain of little help in settling these ideological disputes.

Culturally, the ecomodernist vision of rewilding and universal development runs directly counter to elite romanticisation of Third World agricultural poverty but also to the prevalent fetishisation of locally produced “organic” food. By anticipating a qualitatively different relationship to non-human nature, one in which human sustenance has become increasingly decoupled from the land, ecomodernism points to the long-term liberation of nature from human domination. Attractive as such a future may seem from an ethical point of view, it does leave many difficult questions unanswered, not only about technological feasibility but also the local politics of the envisioned transition and its distributional implications. Still, given the deep unsustainability of the current socio-ecological regime, preserving the status quo may quickly prove to be just as unrealistic as the pursuit of any ecomodernist agenda.

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