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Modernity as a runway

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ABSTRACT

When an airplane is racing down a runway, there is a point when the pilot has to decide whether to take-off or to abort. Beyond that point, the remaining runway is too short to allow the airplane to come to a safe stop. In a similar fashion, modernity as a historic process initially offered three very different possibilities: (1) an acceleration into a post-scarcity space-faring civilization, (2) a deceleration into a "sustainable" way of life, or (3) a catastrophic ecological overshoot which would permanently deplete the natural resource base and lead to irreversible environmental destruction. Using the metaphor of modernity as a runway and human civilization as an airplane travelling at ever higher speeds as we continue to use up non-renewable resources and overloading the planetary sinks, this article analyses this macro-level social choice situation and discusses its implications for global sustainability.

Keywords: global environmental change, sustainability, social choice, democracy, precaution

Introduction

This article offers a new way of thinking about global environmental sustainability. Using the metaphor of an airplane racing down a runway to describe our current ecological predicament, the article provides a theoretical framework which can be used to more systematically distinguish between different normative positions in contemporary sustainability debates and to spell out their implications in terms of macro-level social choice. This is important since it helps us to better appreciate what is at stake in these debates and also make visible the opportunity cost of political procrastination (Gardiner, 2011). At a time when anthropogenic pressures have reached a scale where abrupt global environmental change can no longer be excluded (Steffen, Crutzen & McNeill, 2007) and the ecocidal nature of modern industrial civilization is becoming increasingly apparent (Barnosky et al., 2012), there seems to be an urgent need for radically new visions for global sustainability. Thus, a secondary aim of this article is to point towards a possible direction for such new visions.

The metaphor

Self-aware human life, as in Homo sapiens sapiens, has existed on the Earth for hundreds of thousands of years. For the vast majority of that time, human activities were highly limited in space and time. Even if ecological history shows that humans everywhere have been destructive to their local natural habitats, these damages remained limited to specific sites or regions (as in the deforestation of the Mediterranean coast line during the Roman Empire) and, over time, nature was generally able to recover. As population numbers grew, the aggregate impacts of human activities slowly became less and less negligible. Yet, when the industrial revolution began in England in the 18th century, human society underwent a qualitative shift in its relation to nature, a shift in which scientific and technical knowledge was used to propel humanity along a process we call "modernity". At this time, humans began to deplete the planet's natural resources and fill up its sinks with waste at a rate which was no longer sustainable, in the sense that the aggregate metabolic rate could no longer continue indefinitely.

One way of expressing this process is to imagine an airplane standing at the beginning of a runway. If we think of the runway as representing modernity and the plane as representing human

civilization, we can say that its first slow movements down the runway began right there at the dawn of the industrial age. Although initially limited to a few pockets in the Western hemisphere, it quickly became clear that the Promethean force that had been unleashed would not easily be contained. For humans used to the utter brutality of the elements, the unspeakable horrors of losing loved ones in childbirth, and the abject poverty of a repellent past, the runway of modernity offered a path towards a gradual improvement of the human condition, an attractive vision of a world in which reason would finally break the chains of authority, heal the sick, and bring light and heat to cold winter nights. Once the genie was let out of the bottle, the plane quickly began to pick up speed as we began to use up non-renewable resources and overloading the planetary sinks with greenhouse gases and pollutants at an ever higher rate.

As a historical process, modernity initially offered three different outcomes which expressed in the metaphor of a runway can be defined as: (1) an acceleration and take-off into a space-faring post-scarcity civilization, (2) a deceleration back into a "sustainable" way of life or (3) an overrunning of the runway resulting in a devastating and most likely irreversible crash. To complicate the situation, the people on the plane do not know the length of the remaining runway since it is covered in dense epistemic mist, i.e. we cannot know, at least not a priori, the true resilience of nature nor can we make anything but a crude estimation of the planetary boundaries of the human enterprise (Rockström, 2009). We also know that the plane is making its first and only journey so no one can guarantee that it is in fact airworthy and that it will survive the climb. Beyond such scientific and technological considerations, there is also profound political disagreement in the cabin about what to do. Some passengers insist that the plane can stop any minute if people would just listen to them, others are barely aware that they are in a plane at all, and yet others think that the plane will take-off autonomously thanks to the invisible hands of the market-pilot and that there is no reason for concern.

In the following, this article will explore this metaphor in some detail, focusing both on its scientific and political aspects, with the aim of constructing a theoretical framework for global environmental sustainability which can account for the kind of macro-level social choice which seems called for as we approach what in the world of aviation is known as "decision speed". Decision speed or V_1 means the lowest speed at which the airplane can take-off but also the point

at which it no longer becomes possible to safely abort the take-off. After reaching this speed, the remaining runway is too short even if the brakes are applied and the thrust reversed. In terms of sustainability, that translates into reaching a tipping point beyond which irreversible and abrupt environmental changes will no longer be avoidable (Hansen et al., 2008; Lenton et al., 2008).

The pre-modern world

Human survival has always been at risk but, in the pre-modern world, the threats against it came solely from forces that were outside of human control. A single impact from a bolide of the kind that created the Chicxulub crater on the Yucatan Peninsula, the eruption of a super-volcano in Yellowstone or the sterilizing gamma-ray bursts from a supernova explosion would all have had the potential of bringing an end to the human species. The fact that none of these things happened in the near past is not evidence that they could not have happened nor that they will not happen in the future, it is merely a product of an observation selection effect known as anthropic bias (Bostrom, 2010). The argument is simple enough, had such existential catastrophes happened, we would not be here to observe them.

Even if we chose to ignore such total extinction scenarios, it is important to recognize that, as much as pre-modern life was "sustainable", it also exerted a formidable human toll. This toll came in many different shapes, as in infant mortality, malnutrition, and the constant fear of disease but also in terms of oppressive social hierarchies, endless wars, and religious angst.

Despite this, many contemporary authors in the environmental field have a strong tendency to romanticize the pre-industrial world, sometimes incorrectly describing it as existing in harmony with nature (Lewis, 1992:43-81), but primarily focusing on its perceived existential qualities of belonging, permanence, and authenticity (Certomà, 2008). Much of this debate falls outside the scope of this article and has to do with how we interpret the Enlightenment project and its legacy (Bronner, 2004). Yet, in order to understand the dynamics that have been propelling us down the runway of modernity for the last two and a half centuries, we cannot ignore how poor, nasty, brutish, and short – to use the famous imagery of Thomas Hobbes – that pre-modern existence actually was. Although it may be tempting for privileged 21st century academics to dream of a

world of silent women, great kings and organic communities, we only need to shift the perspective slightly to see that the other side of that romantic world is spelled social control, domination, and exploitation. While all these things certainly exist today as well, the very fact that we find them unacceptable rather than part of a primordially existing and unchangeable order is an indication of how far we have evolved from our savage past.

Down the runway

Looking at the world today, what is difficult to explain is not underdevelopment as much as the fact that development was at all possible. For a very long time, human society remained in a persistent vegetative state in which ignorance, conflict, and disease obstructed progress. Whatever surplus resources that could be extracted went into the fighting of wars or into the building of colossal monuments such as the cathedrals of Europe and the tombs of the Chinese emperors. It is baffling to imagine what would have happened if these resources had instead been used for social investments and universal education. Yet, in the pre-modern world, that door was firmly locked. It took the Enlightenment and its fierce struggle against religious dogma and superstition to realize the possibility of human agency and our ability to consciously shape the future.

As the structural processes of modernity were set in motion, it did not take long for them to break "the ancient tyranny of matter" (Mesthene, 1967:484) and to begin to physically transform the biosphere into a technosphere, initially one of steam engines, railroads, and coal mines. Yet for long, the Earth seemed unlimited from a human vantage point. Its capacity to absorb pollutants was much higher than actual emissions levels and the world's ecosystems seemed infinitely forgiving towards anthropogenic forcing (Wiman, 1991). However, as more and more critical scale thresholds were exceeded, people began to slowly realize the ecocidal nature of modern industrial civilization. The nuclear arms race during the Cold War, the discovery of ecosystem-wide effects of artificially synthesized insecticides such as DDT, and the depletion of the ozone layer were all powerful indicators that human activities were no longer subject to the spatial and temporal limitations of the past but that they were in effect determining the very future of the planet.

The great hope of ecological modernization theory has been that the environmental impact of human civilization would diminish with rising prosperity and greater technological prowess. A number of possible mechanisms for this have been suggested in the literature, including greater energy and resource efficiency, the substitution of hazardous substances, and the globalization of more stringent environmental standards (Mol, 2003). While some environmental indicators, such as the levels of particle and sulphur emissions, have indeed been shown to follow this optimistic pattern, other and more comprehensive indicators such as biodiversity loss, municipal waste, and most worrying, greenhouse gas emissions have not (Spangenberg, 2001; York, Rosa, & Dietz, 2005). In addition, it is clear that part of the observed improvement in environmental quality is due to the displacement of polluting industries to other parts of the world. While this "pollution haven"-effect may not be as strong as some authors seem to believe (Cole, 2004), studies using consumption-based accounting of greenhouse emissions have shown that around 25% of global CO_2 emissions are traded internationally, primarily as exports from China and other emerging markets to consumers in developed countries (Davis & Caldeira, 2010).

Meanwhile, any improvements in eco-efficiency seem likely to be swamped by the sheer numbers of the rising poor as both China and India are undergoing rapid processes of urbanization and industrialization (Sheehan et al., 2008). To return to the runway metaphor, it seems fair to say that it is precisely the massive transformations in these countries that are responsible for the greatest portion of our movement down the runway during the last decades.

Post-ecological hubris

As human civilization continues its race down the runway, a number of people have started to challenge the idea that the length of the runway is in fact limited. In their understanding, nature as we knew it is already over and we are now living in a post-ecological world in which the Cartesian divide between nature and society has proven untenable (Rolston, 1999). Already two decades ago, most terrestrial nature was dominated by humans or at least partially disturbed (Lee et al., 1994). Since then, uncountable natural habitats have been destroyed and traces of human activity can be found everywhere on the planet:

> "It is time to move on. It is time to move on because the defining categories of the debate no longer make sense. While we used to think of humans and nature as self-subsisting realms marked by distinct characteristics and qualities, the two spheres are melding into each other such that it is hard to draw a boundary between them. Empirically, we humans have extended ourselves across and into every ecological niche on the planet, making it impossible to say anymore where humans end and nature begins. Likewise, conceptually, we have come to understand that neither nature nor humanity has a given 'nature' to it, since our ideas of each are social constructs" (Wapner, 2010:109)

Unfortunately, this kind of analysis makes a fundamental categorical mistake by confusing philosophy of knowledge with ecological realities (Dunlap & Catton, 1994). Even if humans have compromised the ecological integrity of the planet, we are still depending on the same biophysical systems for our survival. Although nature may never have been as "stable", "pure" or "harmonious" as some political ecologists wanted us to believe, the unambiguous message is one of increasing volatility and possibly catastrophic systemic risks. When post-ecologists such as Erle Ellis suggest that "humans appear fully capable of continuing to support a burgeoning population by engineering and transforming the planet" (Ellis, 2011:42), they fail to understand the formidable complexities involved in managing change in cumulative dynamic systems riddled with deep structural uncertainties, time inconsistencies, and considerable spatial and temporal scale variability (Dovers & Handmer, 1992; Underdal, 2010). It is in many ways a kind of cognitive hubris to believe that nature and technology can co-exist in this manner and that we can learn to exert just the right amount of anthropogenic forcing to maintain sustainability. Instead of trying to somehow "normalize" the profound environmental changes that are occurring, it seems more reasonable to take them as a last warning that our current development trajectory is fundamentally unsustainable and to accept that the runway is indeed limited.

Towards a new framework for environmental sustainability

At the same time, simply acknowledging the unsustainable nature of human civilization does not do much good. That however does not seem to prevent countless new books and scientific journal articles to be written every year with that exact message. The standard story is

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one of imminent catastrophe unless global capitalism is dismantled (Bond, 2011; Gilding, 2012; Speth, 2008). Sometimes glossy images of an environmentally benign post-capitalist world are offered yet, tellingly, these images come with very sparse descriptions of how such an economy would actually work and what kind of socio-economic steering that would be required to enforce an "equitable distribution of ecological space" (Hayward, 2007) at levels far below the ones currently prevailing in the rich world. Simply put, the social theory of ecological socialism appears as elusive as ever. Meanwhile, unaided by all dependency theories or world-system models, the rise of the poor continues unchecked. It is not difficult to notice a growing sense of discomfort among environmentalists as it is becoming increasingly clear that countries everywhere from Vietnam to Brazil are about to replicate Western modes of development and consumption patterns. In a world of limited ecological space, we should thus not be surprised to learn that the old trade-off between either sacrificing people or nature (Rolston, 1996) seems to be back with full force (Cafaro, 2012). More and more scholars feel tempted to "break the population taboo" and to talk about overpopulation as the obvious elephant in the room (Alcott, 2012; Guillebaud & Hayes, 2008).

No one knows what it would actually take to bring the plane of human civilization to a complete stop in a world of seven billion people. It is obvious that such a reversal in terms of functional differentiation, supply-chain integration, and economic interdependence would require an extreme form of political coordination, not to say, epistemological homogenization. The alternative could of course also be a "disorderly energy descent", a prospect that some political ecologists have recently taken an interest in (Holmgren, 2009; North, 2011). It goes without saying that both the human and the ecological price of such a civilizational collapse would be unfathomable. The mere thought of seven billion people walking out in nature in search of food and fuel should be sufficient to prove why an unplanned decentralization of the economy would not in any way amount to sustainability. However, before returning to these "problems with the breaks" as in how to bring the airplane to a safe stop, we should first consider the other possibility, that of taking-off into a post-scarcity space-faring civilization.

In many ways, space colonization is the obvious answer to the problem of sustainability (Schwartz, 2011). In space, humans would have access to vast amounts of natural resources and energy but most of all we would be able to expand into an environment which is not

part of a sensitive and interdependent ecological system. Unlike on Earth, where every anthropogenic intervention has potentially far-reaching cascading effects across multiple scale levels, space is, for the most part, sterile and what happens there will not affect life on Earth in any direct way. Although many of these things are still beyond our technological reach, space alone seems to offer the kind of decoupling from the natural world that proponents of ecological modernization have been writing about yet have remained unable to define in practical terms. Essentially, space colonization would be about accepting the fundamental incompatibility between nature and technology. But, unlike those who take this as a reason to abandon technology (Zerzan, 2008), space colonization would be based on the premise that our only real chance of saving nature *in time* lies in effectively ending our metabolic presence in it. This would not be the same as denouncing the aesthetic qualities of nature. It would rather be because we care about the beauty of the remaining natural world that we would want to avoid destroying it. As a strategy for sustainability, space colonization is thus surprisingly compatible with a preservationist ethic and more ecocentric forms of morality. Instead of trying to bridge the metaphysical divide between humanity and nature by returning to a lost "sustainable" order, space colonization would seek to more fully separate ourselves from nature (Lewis, 1993). As a first step, this would be about moving heavy industrial manufacturing, mining activities, and toxic waste disposals off the planet. Eventually, other forms of production would follow. Many space-based activities would initially be carried out by robots and nanoscale productive systems but it is likely that increasing numbers of humans would also be tempted to permanently leave the Earth once colonies have been established on Mars and other nearby celestial bodies. With access to unlimited solar energy and abundant mineral reserves in the asteroid belt, human civilization would enter into a post-scarcity state in which virtually everything can be produced or synthesized at a negligible cost thanks to nanoscale industrial processes.

Fantastic as such a future may seem it is of course nothing compared to how utterly unreal our contemporary world would seem to an observer living only a few centuries ago. Yet, considering what is at stake here, it is important to recognize that no one knows if such a future is actually physically possible. Much seems to hinge on a number of key technologies, in particular the possibilities of constructing a so called "space elevator" (Swan & Swan, 2006). Space elevators are necessary to provide seamless integration of

terrestrial and celestial material flows as well as allowing energy to be continuously carried down to the planet's surface. If technologies such as the space elevator are physically impossible to construct, then it is likely that space colonization will for ever remain impossible as traditional launch vehicles are prone to have strict payload limitations and also require massive natural resources both for their construction and operation.

Accepting this uncertainty means acknowledging that reasonable doubts can be had about the airworthiness of the aircraft. At first, it may thus seem like an extremely high-risk strategy to attempt a take-off. But that is only if we do not consider the alternatives. As we have already seen, bringing the plane to a complete stop may be extremely difficult in terms of politics in a pluralistic world of conflicting national interests. At best, it seems as if traditional environmental politics will be able to slow down the aircraft somewhat but not halt either the depletion of non-renewable resources or the overloading of the planetary sinks. That is not to say that it is theoretically impossible to imagine a world in which the plane does indeed come to a complete stop, in fact, we only need to look to history for ideas about what such an order would have to look like. What is somewhat more difficult to imagine is what kind of controlling entities that would be required to prevent unsustainable patterns from spontaneously re-emerging at some point in the future.

As a theoretical framework for global environmental sustainability we can now schematically identify two options, either an acceleration into a post-scarcity space-faring civilization (A) or a deceleration of overall metabolism until sustainability is achieved (B):

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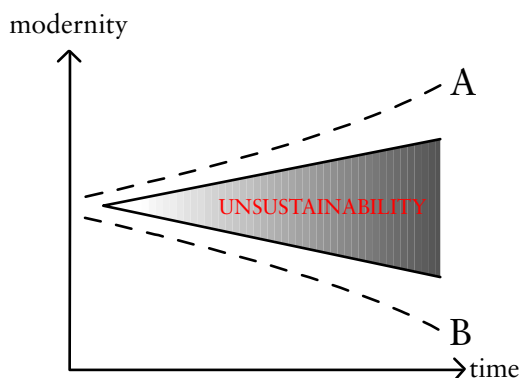
Obviously, "modernity" is not a single-dimensional concept. Yet, for the purpose of this article, it does make sense to think of modernity as the industrial and sociological process that grew out of the Enlightenment and which can be characterized by ever higher levels of functional differentiation, accelerating flows of energy and material resources, and capital accumulation. Any book on sustainability will explain that it is precisely these processes that have to be slowed down and ultimately reversed if sustainability is to be achieved. It is a basic premise of political ecology that the world has become too integrated, that we need to learn to "make use of less" and that the rate of change has to come down. Somewhat of the opposite would be true for a take-off scenario which seems to depend on more specialized forms of knowledge production, massive social investments to drive economic growth, and deepening economic globalization to avoid resource scarcities (Deudney, 1990:470) but also to prevent distracting military conflicts. Unlike more traditional paths to sustainability, such a strategy would make use of processes and mentalities that already are in place rather than requiring a fundamental re-orientation of all social priorities (Lewis 1996:221). The risk is of course that even an acceleration of these processes will prove insufficient given the limited length of the remaining runway.

Precaution and economics

Every pilot knows that decisive action may sometimes be required. Racing down a runway, in particular one of unknown length covered in thick mist, failure to take such decisive action may result in a catastrophic crash as the airplane overruns the runway. Yet, not knowing whether the plane is airworthy, most pilots would of course try to bring the airplane to a stop rather than recklessly taking off into the skies. But that is only true if the pilot knows that he or she will indeed be able to come to a complete stop prior to the end of the runway. Otherwise, even if suffering from critical engine failure, flight manuals mandate that a take-off is conducted, if only so that the aircraft may later return safely to the airport.

Much of this metaphor seems to hold up also for sustainability. Transitioning to a space-faring civilization appears to be a very sensible precautionary action even if we believe that nature is more resilient than the scientific consensus suggests. Inexpensive access to space is likely to open paths to rapid global economic growth, something that in its turn will be crucial not only for job creation and for securing the fiscal sustainability of retirement schemes but also for

avoiding the political polarization which comes with all zero-sum distributional conflicts. The same can of course not be said about trying to slow down modernity. If the environmental risks have indeed been exaggerated, such an action would lead to enormous unnecessary suffering and also distract our attention away from more pressing social problems, as argued by the so called Copenhagen Consensus (Lomborg, 2004).

Another important aspect in terms of precaution is the fact that space colonization would make possible a "civilization backup" in case the Earth were to suffer a cataclysmic disaster of some kind (Shapiro, 2009). As our technology would evolve, the technological maturity made possible by space colonization would also in itself be instrumental in preventing future celestial catastrophes such as bolide collisions and thereby ultimately also securing our long-term survival as a species. Again, it is important to remember that "there may be only a brief window of opportunity for space travel during which we will in principle have the capability to establish colonies (which could in turn establish further colonies). If we let that opportunity pass without taking advantage of it we will be doomed to remain on the Earth where we will eventually go extinct" (Gott, 1993:319).

It is of course impossible to estimate how much it would in fact cost to colonize the inner solar system and shift all industrial activities off the planet in the manner suggested above. It seems safe to assume that the costs would run into trillions of USD and require a sustained international effort as well as the scientific ingenuity of people from all over the world. Yet, whereas the kind of degrowth strategies suggested by political ecologists would amount to a literal one-way street towards economic ruin from the viewpoint of classic economic theory, an acceleration of modernity would be highly compatible with the existing economic system. Not only would it provide a policy framework for macroeconomic growth which appears far more stable than say housing, dotcom stocks or Dutch tulips, space colonization would also, just like military and defence related research in the past, be likely to drive innovation throughout the rest of the economy (Ruttan, 2006).

The paradox of urgency

The obvious objection against space colonization as a strategy for sustainability is that we do not have the time to wait for such technological breakthroughs. The environmental crisis is happening here and now. Yet, unlike an airplane which is normally commanded by two pilots, the fate of the metaphorical airplane of human civilization is dependent on the autonomous wills and desires of billions of different people. This makes decisive action, in all directions, extremely difficult (Karlsson, 2013).

Much green political theorizing is written as if politics did not matter (Shellenberger & Nordhaus, 2004:25) or as if the limited public support for robust environmental action is just some kind of temporary historical anomaly which will simply go away once broader environmental changes occur (Gardiner, 2009). Some scholars such as Dale Jamieson seem perplexed by the fact that even if many Americans identify themselves as environmentalists, they show little willingness to voluntarily restrain their behaviour or to support specific fiscal policies that would result in increased levels of environmental protection (Jamieson, 2006). Others, such as Ingolfur Blühdorn and Matthew Humphrey, find this to be highly consistent with a simulative form of environmental politics which lacks any authentic desire to move away from democratic consumer capitalism (Blühdorn, 2007; Humphrey, 2009). We may know that what we are doing towards the environment is wrong but few seem willing to voluntarily forfeit the fruits of modernity.

Seeing such "moral weakness", maybe even in their own lives, most political ecologists call for deeper, institutional reforms. Often, new draconian taxes on everything from gasoline to animal products are suggested as a way of reducing our environmental impact and to facilitate the kind of lifestyle changes that otherwise may seem unattainable. The problem is of course that such taxes risk provoking a strong political backlash. Already today we are seeing how the question of climate change has become highly polarized in many countries, sometimes even to a point that makes rational discourse impossible (Hoffman, 2011). If it has been this difficult to achieve even modest environmental reforms that are still compatible with the existing economic framework, it seems almost impossible to imagine the kind of political will power which would be required to dismantle modern industrial civilization in its totality.

Thus we shall not be surprised to find that most environmentalists argue for more pragmatic forms of environmental action. It is likely that such reforms, if carried out with great creativity and political imagination, would be able to take away some unknown percentage of global environmental impacts. But once this low hanging fruit has been picked and we are approaching the structural processes of modernity as such, it becomes far more difficult to achieve improvements in eco-efficiency, especially if we consider overall population growth and the rising levels of affluence in China, India, and elsewhere.

The paradox of urgency thus consists in that space colonization and other radical technological strategies for sustainability are rejected because of their inability to deliver immediate improvements in sustainability, yet the same seems be true for virtually any radical agenda for environmental reform. Given the cumulative nature of many biophysical processes, most notably the carbon cycle, this means that, while the world procrastinates, we continue to move down the runway but without achieving the speed necessary for take-off. Instead of investing our scarce resources in aerospace research and development, we are using the same resources to produce ever more cars, military material and arms.

Macro-level social choice and democracy

Deciding what strategy, if any, humanity will use to achieve environmental sustainability is destined to be one of the most important macro-level social choices that we will ever make as a species. Its repercussions are to a large extent even beyond our imagination. From a simple utilitarian viewpoint, the opportunity cost of delayed technological development and space colonization is known to be formidable (Bostrom, 2003). That argument however only makes sense if space colonization is indeed technically possible. If it is not, attempting to pursue such a strategy may in fact hasten an environmental apocalypse and thus lead to an overall loss in human welfare. The problem is that we do not know.

Moving down the runway at ever higher speeds, a typical neoliberal response would be that technologies will be developed when they are needed and that there is no reason to make any vast public investments prior to that need. It is not difficult to refute this argument since it is based on the premise that, once the environmental crisis becomes acute, there will still be enough time to

develop the required technologies. Given the nonlinear and time-lagged nature of many ecological systems, we know that premise to be false. Even if there would still be *some* time available at the end of the runway, it would be an extremely risky bet. Similarly, many neoliberals would argue that financial markets are able to accurately predict all future needs. Again, the recent economic crisis should be more than sufficient evidence that markets are particularly bad at correctly estimating the kind of systemic risks that we are here concerned with.

Unable to use markets for prediction, the best option seems to be to attempt a conscious decision. To be meaningful, we have to base that choice on a robust assessment of ecological trends (trying to see through the epistemic mist to determine how much of the runway that still remains) but also on a political assessment of what kind of policy that we reasonably think will have a chance of succeeding in a pluralist world. From the perspective of democratic theory, it is perplexing to think that this macro-level choice, being one the most important that we will ever make as a species, cannot easily become subject to democratic decision-making. The mere thought of having a global referendum in which the two options would be "space colonization" or "deep ecology" is inevitably farcical. It is also clear that most people would reject these two radical options and instead seek some kind of pragmatic middle-of-the-road strategy, probably one based on piecemeal ecological modernization. The tragic irony is that it is precisely that kind of pragmatism that lies at the root of our current predicament.

The fact that a global referendum may be impossible should however not be taken as an argument against democratic deliberation on the issue of global sustainability. If anything, there seems to be an urgent need for a new democratic debate about the future of humanity, one that recognizes not only the limits of the natural world but also the fundamental open character of the human enterprise (Karlsson, 2012).

Conclusions

It is a platitude that infinite growth is impossible on a finite planet. But it is less of a platitude to ask why we should accept such an arbitrary restriction on human activities? Considering what we have done to the Earth, it is obvious that we are not good stewards of it and that, if present trends continue, we will have seriously

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compromised the life supporting ability of the planet within the next few generations. Instead of simply hoping that nature is more resilient than we think or that people will suddenly come to their senses and embrace political ecologism, we need radically new visions for sustainability. Through the metaphor of an airplane running down a runway, this article has sought to offer a better understanding of the kind of macro-level choice that modernity seems to present to humanity. Some people will always say that we should not overblow fears and that there is plenty of time yet to make any grand decisions. As much as we should of course hope that they are right, it seems grossly irresponsible to bet the whole future of humanity on this simply assertion, especially as the evidence shows that human activities are becoming the dominating forces on a geological level. If nothing else as a precaution, we should consider the ultimate fate of our species and the limits of our cognitive abilities. As evident from this article, we may have good reasons to doubt our chances of ever achieving mastery over nature through technology. However, unlike what is often suggested in the literature, this could also be taken as reason for leaving and restoring nature while employing our technological abilities elsewhere to build a bright cosmic future.

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