

Three Interpretations of the Anthropocene: Hope and Anxiety at the End of Nature

“In his first attempt at a Latin grammar, M. Terentius Varro is said to have forgotten the future tense; philosophically, it has still not been adequately considered to this day.”

—Ernst Bloch, *The Principle of Hope*

Thinking about the future condition of humanity can be troubling. It was disconcerting to Immanuel Kant in a way that might seem strange to us:

What remains disconcerting about all this is firstly, that the earlier generations seem to perform their laborious task only for the sake of the late ones, so to prepare for them a further stage from which they can raise still higher the structure intended by nature; and secondly that only later generations will in fact have the good fortune to inhabit the building on which a whole series of their forefathers (admittedly, without any conscious intention) has worked without themselves being able to share in the happiness they were preparing.¹

This is a characteristic piece of optimism of an age that had come to recognize that growth in knowledge and capital redounds to future generations. We build not only for ourselves but for our descendants. But such optimism may be less common in the age in which humanity is said to be in danger of exceeding planetary boundaries, disrupting fundamental natural systems, such as the climate system, with potentially devastating effects.² We are far too aware of the dangers that we are transmitting to future generations to share wholeheartedly Kant’s view. A recent article in the *Guardian*

¹ Immanuel Kant, “Idea for a Universal History with a Cosmopolitan Purpose,” in Hans Reiss, ed. and H.B. Nisbet, trans., *Kant’s Political Writings* (Cambridge: Cambridge University Press, 1970), p. 44.

² Johann Rockström, et al. “A Safe Operating Space for Humanity,” *Nature* (2009) 461: 472–475. DOI: 10.1038/461472a

newspaper warned that “if we don’t take action on climate change now, the food shortages, mass migration and political turmoil it will cause could see the collapse of civilisation in our lifetimes.”³ Speaking at the United Nations President Barack Obama urged “that we risk consigning future generations to an irreversible catastrophe.”⁴

The idea of the *Anthropocene* has come to be the focal point of some anxiety about the future. A recent article in *Science* reports that human impact on Earth systems is pervasive and readily identifiable.⁵ Carbon dioxide and methane concentrations in the atmosphere due to fossil fuel combustion now exceeded those of the previous 10,000 years, the *Holocene* epoch. Fallout from atomic weapons tests and usage as well as from thermonuclear weapons tests has left a clear radioactive signal. Over the past century fertilizer use in agriculture has doubled nitrogen and phosphorous inventories in soils and produced nitrate levels in Greenland ice sheets that are higher than any time in the last 10,000 years. And species are going extinct at rates unprecedented in the last 500 years. In 2000 Paul J. Crutzen and Eugene F. Stoermer first proposed the term *Anthropocene*. “Considering these and many other major and still growing impacts of human activities on earth and atmosphere, and at all, including global, scales, it seems to us more than appropriate to emphasize the central role of mankind in geology and ecology by proposing to use the term ‘anthropocene’ for the current geological epoch.”⁶ Although Crutzen and Stoermer warn of dangers, they close their piece in a hopeful, even if technocratic, register. “To develop a world-wide accepted strategy leading to sustainability of ecosystems against human induced stresses will be one of the great

³ Ellie Mae O’Hagan, “Climate optimism has been a disaster. We need a new language – desperately,” *The Guardian* 21 Sept. 2017. <https://www.theguardian.com/commentisfree/2017/sep/21/climate-optimism-disaster-extreme-weather-catastrophe>

⁴ Barack Obama. See “Text of Obama’s Speech,” *New York Times* 22 Sept. 2009. <http://www.nytimes.com/2009/09/23/us/politics/23obama.text.html>

⁵ Colin N. Waters, et al., “The Anthropocene is functionally and stratigraphically distinct from the Holocene,” *Science* (2016) 351: 137-147. DOI: 10.1126/science.aad2622.

⁶ Paul J. Crutzen and Eugene F. Stoermer (2000). “The ‘Anthropocene’”. *Global Change Newsletter* 41: 17. <http://www.igbp.net/download/18.316f18321323470177580001401/1376383088452/NL41.pdf>

future tasks of mankind, requiring intensive research efforts and wise application of the knowledge...An exciting, but also difficult and daunting task lies ahead of the global research and engineering community to guide mankind towards global, sustainable, environmental management.”⁷

The *Anthropocene* seems to be the result of a long term process of the acquisition of human knowledge and engineering skills applied to the natural environment in order to realize human purpose. Over time the process produced material progress and transformed nature. In an effort to explain the arc of material progress GA Cohen appeals to two human characteristics: intelligence and rationality under conditions of scarcity. These feature as elements comprising a mechanism that accounts for a tendency towards the growth of productive forces in history. This tendency he refers to as the “Development Thesis.”⁸ The elements of the mechanism are the following:

- (1) The historical situation of humans is characterized by scarcity such that unless they spend the better part of their time engaged in labor, which is not experienced as an end in itself, they will not satisfy their wants.
- (2) Humans possess sufficient intelligence to enable them to improve their condition.
- (3) Humans are rational in the sense that insofar as they know how to satisfy compelling wants, they are disposed to seize and employ the means of doing so.

⁷ *Ibid.*, p. 18.

⁸ GA Cohen, *Karl Marx's Theory of History: A Defence* expanded ed. (Princeton: Princeton University Press, 2001), 152. I have re-arranged the order of these three claims for the sake of clarity.

Part of what makes Cohen's account so intriguing is that it takes human beings as in a certain sense progressive by nature.

Human prehistory during the *Pleistocene* suggests, however, that Cohen's mechanism is too strong. If it were true, we should expect periods of stagnation or decline to be the exception and explainable by exogenous factors. According to it one would expect a tendency towards steady growth in productive forces. In fact, however, *Homo sapiens* and archaic humans used stone tools, with little development for over two million years. During roughly the first 190,000 years of existence anatomically modern humans were unable to produce any sustained growth in productive forces. There is a debate among those studying the available evidence about whether what is referred to as "behavioral modernity" arose suddenly. Some scholars defend a so-called "human revolution," perhaps accompanied by a genetic change, that occurred about 50,000 years ago, being characterized by the development of tools, greater dissemination of art, and the development of complex languages.⁹ Other scholars claim that these changes were the result of tens of thousands of years of very slow development.¹⁰ In either case, for more than 100,000 years there was hardly any growth in productive forces. And as developments occurred they were slow for tens of thousands of years thereafter. An additional reason to think that there was little progress in the development of productive forces during the *Pleistocene* is that the available evidence suggests no significant population growth.¹¹ The environment of the *Pleistocene* in which humans hunted and gathered made survival difficult and time consuming; it was not particularly hospitable for preserving the gains of knowledge.

⁹ See Richard Klein, "Anatomy, behavior, and modern human origins," *Journal of World Prehistory* 9 (1995): 167–198 and Ian Tattersall, "Human origins: Out of Africa," *PNAS* 106 (2009): 16018–16021.

¹⁰ Sally McBrearty and Allison Brooks, "The revolution that wasn't: a new interpretation of the origin of modern human behavior," *Journal of Human Evolution* 39 (2000): 453–563.

¹¹ John Hawks, et al. "Population Bottlenecks and Pleistocene Human Evolution," *Molecular Biology and Evolution* 17 (2000): 2–22.

The *Pleistocene* was an epoch of repeated glaciation and warming coming and going in roughly 100,000 year cycles.

Around 11,000 years ago, as *Holocene* began, the global mean temperature increased and climatic variations were comparatively mild. The *Holocene* climate was particularly conducive to human flourishing. Circumstances for passing on improvements in productive forces improved. In several locations groups of people transitioned from hunting and gathering to settled agricultural communities. Over time civilizations emerged in several places, Mesopotamia, Egypt, the Indus River basin, China, and Mesoamerica. The fortuitous coincidence of a stable and relatively mild climate and human intelligence and rationality permitted material progress. This suggests that Cohen's account of the mechanism that explains the tendency of productive forces to grow should also include a fourth element.¹²

(4) Circumstances are such that when humans labor, improvements can be passed on to at least some successor generations.

With addition of (4) progress requires the cooperation of the natural environment. And even still a tendency of productive forces to grow is no insurance against exogenous shocks. War, pestilence, and famine remained threats. But stagnation or decline requires explanation if the tendency—whether slow or fast—towards growth is the default.

The Industrial Revolution constituted a major advance in material progress. The economist Thomas Piketty reports that global economic growth per capita from 1700 to 2012 was on average 0.8 percent annually, which amounts to more than a 1000 percent increase over the entire period. According to Piketty, "Average global per capita income

¹² See my "Progress, Destruction, and the Anthropocene," *Social Philosophy and Policy* 2017.

is currently around 760 euros per month; in 1700 it was less than 70...”¹³ This growth has brought many benefits. Increased longevity is one. In the United Kingdom at the dawn of the Industrial Revolution, life expectancy at birth was about 40 years. It is now about 80 years. Longevity has increased even in many poorer parts of the world. For example, at the turn of the 20th century life expectancy in India was about 24 years, and it’s now about 65 years.¹⁴ Better education is another benefit. At the time of the Industrial Revolution over 80 percent of the global population was illiterate; now it is less than 15 percent.¹⁵ And increased leisure time is a third benefit. Retirement has only recently been possible on a wide scale. In 1850 the majority of the male population 65 and older living in the USA was still working. Today less than a quarter of that population is working.¹⁶ Freedom from toil has long been a utopian dream of those who must spend a good portion of their day engaged in work that is not valuable for its own sake. As technological developments improved productivity, working class movements were able to struggle for a shortened working day and for old age pensions schemes.

Recalling the language of Kant, we have had the great good fortune to enjoy the building built by our ancestors. The construction, however, also left a detectable signature on the planet. We now dwell in the *Anthropocene*. Our understanding of that is still in formation. I turn in the next three sections to three interpretations of the *Anthropocene*.

¹³ Thomas Piketty, *Capital in the Twenty-First Century* (Cambridge, MA: Harvard University Press, 2014), p. 86.

¹⁴ “Life Expectancy,” Max Roser, *Our World in Data*. <https://ourworldindata.org/life-expectancy/>

¹⁵ “The Global Rise of Education,” Max Roser and Estaban Ortiz-Espana, *Our World in Data*. <https://ourworldindata.org/global-rise-of-education>

¹⁶ “Economic Growth,” Max Roser, *Our World in Data*. <https://ourworldindata.org/economic-growth#globally-over-the-last-two-millennia-until-today>

The Anthropocene as Promethean

The Titan god Prometheus befriended humankind with the gift of fire. Fire has been a tremendous energy resource for human beings. From the beginning of the Industrial Revolution to the present human beings have burnt fossil fuels with ferocity, releasing over 600,000,000 tons of CO₂.¹⁷ The emissions were a side-effect of energy production and consumption that raised the standard of living of many of use beyond precedence in history and has now freed vast portions of humanity from many of the worst forms of traditional drudgery. As we transition to renewable energy, use smart technology to increase efficiency, and develop new forms of work organization the process of liberation could continue.

There are three pillars upon which the interpretation of *Anthropocene* as Promethean rests. The first is poverty reduction and prosperity creation. The reduction in poverty that has occurred has been driven by economic growth. The economic growth that has transformed human life since the advent of the Industrial Revolution may be expected to continue with compounded benefits to future populations. The Intergovernmental Panel on Climate Change employs a baseline assumption of 700 percent economic growth over the course of the 21st century.¹⁸ In other words, the IPCC employs forecasts that project that without additional mitigation the global economy will grow over the course of this century at a rate similar to the growth from the Industrial Revolution till now. Imagining the changes that that would bring to humanity is only slightly easier for us than it would have been for Kant's contemporaries to imagine our lives. Slightly easier because we have the advantage of being able to look

¹⁷ IPCC, *Climate Change 2014*, p. 8-10.

¹⁸ *Ibid.*, p. 24.

back at a period of unprecedented growth. Piketty's reminder about the past 30 years is useful in guiding our imagination about the future:

Over a period of thirty years, a growth rate of 1 percent per year corresponds to cumulative growth of more than 35 percent. A growth rate of 1.5 percent per year corresponds to cumulative growth of more than 50 percent. In practice this means major changes in lifestyle and employment. Concretely, per capita output growth in Europe, North America, and Japan over the past thirty years has ranged between 1 and 1.5 percent, and people's lives have been subjected to major changes. In 1980 there was no Internet or cell phone network, most people did not travel by air, most of the advanced medical technologies in common use today did not yet exist, and only a minority attended college.¹⁹

Recent World Bank reports and forecasts have the global economy growing at a rate of 3 percent per annum.²⁰ At that rate the economy would double in 24 years. Piketty argues that growth will flatten out by mid-century as a major factor, demographic growth, flattens.²¹ But until then for a few decades, growth in an educated work force, almost entirely in the developing world, may play an equalizing role on incomes (if not wealth) of the global economy.

The existence of non-trivial benefits from the industrial, agricultural, and commercial activity that is driving the *Anthropocene* affects our moral judgment about how to respond. One model of thinking about future environmental damage sees present activity that contributes to subsequent environmental damage as wrong because harmful. But if the activity in question creates benefits that redound to the future, then we are not simply creating harm. More importantly, serious moral reflection has to consider what sort of mix of harm and benefits would result from an alternative policy that would favor less harm to the environment.

¹⁹ Piketty, *Capital*, p. 95.

²⁰ World Bank Group, *Global Economic Perspectives: Broad Based Upturn, But For How Long?* (Washington, D.C.: The World Bank, 2018), p. 4.

²¹ Piketty, *Capital*, p. 357-358.

Among the alternatives available to our policy-making there is not likely to be one in which all the consequences line up positively. As I have suggested elsewhere, we do not occupy a policy control tower in which with a single pull of a lever we could be assured that every consequence would be positive.²² For example, the IPCC relies on research that suggest that mitigating climate sufficiently to make it likely that warming would be kept below 2°C would likely reduce economic growth by 5 percent over the course of this century.²³ In the context of 700 percent forecasted growth, that's not a lot, but it needs to be compared to the alternatives of less mitigation and defended. There are mixed results no matter how we proceed. Moreover, in the case of mitigation, although the costs can be deferred to some extent, at some point, earlier generations must accept costs in order to prevent costs from being assumed by wealthier subsequent ones. That is simply a fact of any successful mitigation policy since once an energy transition has been completed there would be no additional mitigation costs. As the economist Nicholas Stern puts it, the cost "is 'one-off' because costs will be incurred mainly from using one method of generating energy rather than another; once we have made the shift, we will stay with the new methods or base technical progress strategies on moving beyond this new blend of activities."²⁴

The second pillar upon which the interpretation of the *Anthropocene* as Promethean rests is technological innovation, which might provide answers to ecological problems. Economic growth has driven technological development in recent years. Piketty emphasizes this point. "[P]er capita output growth in Europe, North America, and Japan over the past thirty years has ranged between 1 and 1.5 percent, and

²² Darrel Moellendorf, *The Moral Challenge of Dangerous Climate Change: Values, Poverty, and Policy* (Cambridge: Cambridge University Press, 2014), Appendix B.

²³ IPCC, *Climate Change 2014*, p. 24.

²⁴ Nicholas Stern, *The Global Deal: Climate Change and the Creation of a New Era of Progress and Prosperity* (New York: Public Affairs, 2009), p. 54.

people lives have been subject to major changes. In 1980 there was no Internet or cell phone network, most people did not travel by air, most of the advances medical technologies in common use today did not exist, and only a minority attended college.”²⁵ The product innovations that are a consequence of modest economic growth [may] provide solutions to some [of] our most pressing environmental problems, such as the generation and storage of renewable energy, and the problems of temperature increase due to the trapping of solar radiation by greenhouse gases.

Innovation is driving down the price of renewable energy. According to the International Energy Association (IEA) the cost of generating renewable energy is falling rapidly. Since 2010 the costs of generating electricity by means of solar photovoltaic cells has dropped 70 percent and by means of wind 25 percent.²⁶ IEA has drawn up a Sustainable Development Scenario, in which energy production is nearly completely decarbonized by 2040 and full access to clean cooking energy and electricity is provided by means of highly efficient appliances and decentralized renewable energy generation.²⁷

Absolute costs of renewable energy are rapidly declining, and its costs in comparison to fossil fuels is falling even more quickly as the costs of the latter are recognized to be higher than we previously reckoned. A report by the Union of Concerned Scientists argues that,

Costs accrue at every point of the fossil fuel supply chain. Extraction processes can generate air and water pollution, and harm local communities. Transporting fuels from the mine or well can cause air pollution and lead to serious accidents and spills. When the fuels are burned, they emit toxins and global warming

²⁵ Piketty, *Capital*, p. 357-358.

²⁶ International Energy Association (IEA), *World Energy Outlook 2017 Executive Summary*. <https://www.iea.org/Textbase/npsum/weo2017SUM.pdf>

²⁷ *Ibid.*

emissions. Even the waste products are hazardous to public health and the environment.”²⁸

The immediate negative health effects of the pollution caused by the burning of fossil fuels are especially important. The US National Academy of Sciences, reports that in 2005 alone the negative health effects of the particulate matter, sulfur dioxide, and oxides of nitrogen produced from 406 coal fired electricity plants in the continental US resulted in costs of \$62 billion. The vast majority of the damages resulted from premature mortality.²⁹ According to a recent study burning coal in China causes 366,000 premature deaths a year.³⁰ A transition to renewable energy makes good economic and moral sense in light of the long term effect of climate change. But increasingly it is clear that it makes sense over the short term as well in light of the health costs of fossil fuels.

Another area in which technological innovation will be important has to do with diverse forms of technology grouped together under the ill-defined category of climate engineering. I shall focus here only on the means by which carbon could be removed from the atmosphere for storage. In Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) scenario RCP 2.6 is one deemed likely to limit warming to 2°C, which would correspond to an atmospheric concentration of 450 CO₂ eq. RCP 2.6 is based on 116 models fully 87 percent of which employ carbon dioxide removal.³¹ By 2017 atmospheric concentrations had already overshoot the RCP 2.6 target and

²⁸ The Union of Concerned Scientists, “The Hidden Costs of Fossil Fuels.” <https://www.ucsusa.org/clean-energy/coal-and-other-fossil-fuels/hidden-cost-of-fossils#.Wo7up3yDPX4>

²⁹ National Academies of Science, Engineering, and Medicine, *Hidden Costs of Energy: Unpriced Consequence of Energy Production and Use*, p. 340. <https://www.nap.edu/catalog/12794/hidden-costs-of-energy-unpriced-consequences-of-energy-production-and>

³⁰ Edward Wong, “Coal Burning Causes the Most Pollution Deaths in China, Study Finds,” *New York Times*, Aug. 17, 2016. <https://www.nytimes.com/2016/08/18/world/asia/china-coal-health-smog-pollution.html>

³¹ Pete Smith, et al., “Biophysical and Economic Limits to Negative Emissions Technology,” *Nature Climate Change* 6 (2016): 43.

reached 493ppm CO₂eq.³² Hence, the need to use carbon dioxide removal seems almost certain. More recently the IPCC published a report on 1.5°C. And all of the models that they looked at for limiting warming to 1.5°C rely on negative emissions.³³ The forms of carbon dioxide removal assumed in the models in both IPCC studies are afforestation plus reforestation and Bio-Energy with Carbon Capture and Storage (BECCS). Generally, the more concentrations overshoot the target, the greater the reliance on BECCS, which involves growing crops, burning them for energy, capturing the carbon, and then storing it. In order to sequester the amount of CO₂ required by some of the IPCC scenarios there would need to be 16,000 BECCS plants by 2050.³⁴ Currently, however, only three such plants are operational.³⁵ Technological innovation is most certainly necessary. And the Promethean interpretation of the *Anthropocene* rests in part on the hope of such innovation.

The third pillar of the Promethean interpretation is the capacity for growth in international cooperation to govern the threats to planetary boundaries and create the conditions in which humans can flourish in peace, absent the worst forms of international rivalry. One problem that governance of planetary systems needs to solve is the existence of pernicious collective action problems. This is well illustrated in the case of climate change where the Tragedy of Commons problem exists, which has the following form: Although every state has an interest in their being a robust and effective climate change mitigation regime, in crucial cases states have no interest in assuming the costs of mitigation, regardless what the other states do. If they assume the costs of mitigation and many other states do not, then they will have subjected themselves to

³² Intergovernmental Panel on Climate Change, *Climate Change 2014 Summary for Policymakers*, p. 20, fn. 15.

³³ IPCC, *Global Warming of 1.5°C*, p. 16.

³⁴ Lenzi et al. 2018

³⁵ Lenzi et al. 2018.

costs without achieving the aim. But if they don't assume the costs and enough other states do, then they can still enjoy the benefits of mitigation. In circumstances in which states are obliged to secure the interests of their citizens shirking climate costs may even promote their capacity to do so in the short run.

One of the major accomplishments of the Paris Agreement on climate change is that every state voluntarily assumed a measure of responsibility for climate change mitigation. This is a major accomplishment since the global economy must become net zero by the middle of this century to make possible the goal of limiting warming to 1.5°C. The cooperation that produced the Paris Agreement is important, but the results thus far are inadequate. Estimates of the commitments made in Paris suggest that even if they were kept, the mean temperature of the planet would stabilize at around 3°C.³⁶ The framers of the Paris Agreement predict the insufficiency of initial pledges, and the Agreement contains provisions for periodic review—every five years—and that states that renewed pledges should “reflect the highest possible ambition.” At the diplomatic level there is a basis for negotiation and further progress.

The hope for progress is further supported by technological developments driving down the costs of renewable energy. As the costs of renewable energy reach parity with the costs of fossil fuels, the basis of the Tragedy of Commons vanishes. That collective action problem is driven by the assumption that mitigation is costly, and the disincentive that parties have to assume costs. When it is no longer costly in comparison to fossil fuels to generate energy by renewable means, the material basis for cooperation rather than mistrust is secured.

³⁶ United Nations Environmental, *Emissions Gap 2017 Report*, p. 18. https://wedocs.unep.org/bitstream/handle/20.500.11822/22104/EGR_2017_ch_3.pdf?sequence=1&isAlloved=y

Recall the discussion of the Development Thesis from the previous section. The Anthropocene as Promethean fits well with the claims of human intelligence and rationality that were at the basis of the Development Thesis's explanation of human material progress. Clearly the Thesis could only be weakly predictive since exogenous shocks, such as environmental catastrophes are not ruled out by the Thesis. Still its plausibility is a reason for hope in the present interpretation.

The Anthropocene as Destruction

Recent scientific work supports the idea that industry, agriculture, transportation, and consumption are putting fundamental planetary systems under stress. Johann Rockström has offered the helpful heuristic of planetary boundaries for understanding the nature of this problem.³⁷ The basic idea is that human activity creating dangerous instability in nine areas, the climate change, biosphere integrity, land system change, fresh water use, bio-chemical flows, ocean acidification, atmospheric aerosol loading, stratospheric ozone depletion, and novel entities. The idea of danger is normative. It rests on both moral judgment and scientific assessment of risks. To identify a policy or trend as dangerous, in the sense of something to be avoided, is to assert more than that it is risky. It's to assert that it is too risky.³⁸ And whether an option is too risky depends crucially on the alternatives that one has to that option. In contrast to destabilization in each of these nine areas Rockström advocates seeking to maintain *Holocene* stability. Unlike in the *Holocene*, however, such stability would be managed. As an alternative to destabilization in these areas, which could lead to nothing short of catastrophe, *Holocene* stability is surely attractive. After all, as we have surveyed, the Holocene was

³⁷ Rockström, et al. "A Safe Operating Space."

³⁸ Moellendorf, *The Moral Challenge of Dangerous Climate Change*, chp. 1.

the period in which human civilization and massive material progress occurred. Threats to this stability look dangerous.

There is, however, considerable worry that current economic relations undermine the possibility of *Holocene* stability. Consider this paraphrase of an argument by GA Cohen:³⁹

1. Under capitalist property relations economic competition between firms requires continual productivity gains.
2. Improvements in productivity can be used either to reduce labor while maintaining outputs or output may be increased while labor stays the same (or some combination of both).
3. Capitalist production tends to promote output production since the other threatens profits garnered from sales, and therefore loss of competitive strength.
4. Output production depletes resources and creates pollution and is a fundamental contributor to stress placed on planetary systems.
5. Therefore, capitalism tends to deplete resources, creates pollution, and contributes in a fundamental way to stress of planetary systems.

Premises three and four are crucial to this argument. Four seems to be a relatively straightforward empirical claim. If it is true, then much depends on three. Three cites a tendency. Suppose it is also the case. Can it be contained by political means? Whether the tendency towards output production can be tamed under capitalist property relations would seem to be a deeply important question for the destructive potential of the *Anthropocene*.

³⁹ GA Cohen, *Karl Marx's Theory of History: A defence* expanded ed. (Princeton: Princeton University Press, 2001), Pgs. 302-307.

There is a deep problem that is a source support for the interpretation of the *Anthropocene* as destruction and therefore of anxiety as well. The need for, and possibility of, innovation supports the Promethean interpretation. But that innovation results from growth, which is itself simply a measure of output production. Although growth appears to be a source of the solution to prosperity in the *Anthropocene*, its destructive character drives the present interpretation. This suggests the possibility of a tragedy. Can the *Anthropocene* as destruction be avoided in pursuit a Promethean vision? Capitalist competition has proven to be unrivaled historically in producing growth and driving innovation, but that very competition could undermine the ecological basis of prosperity. Hope would seem to rest on the possibility of politically directing growth to avoid destruction while promoting prosperity and innovation.

The Anthropocene as Inegalitarian

There are indications that the *Anthropocene* could be marked by severe and growing inequality. Three drivers of inequality are apparent. The first is contextual and largely exogenous to the developments that characterize the era as the *Anthropocene*, but because it compounds inequalities that arise more directly from a changing environment it merits mention. We seem to be in the midst of trend towards growing global inequality. A recurring point in Piketty's book is that low growth economies disproportionately benefit owners of capital who reap returns on investments above the rate of growth. When growth is low inherited wealth persists and family background plays the predominant role in determining life prospects. Whereas in fast growing economies what one can earn and save on one's own takes on greater importance.⁴⁰

⁴⁰ Piketty, *Capital in the 21st Century*, p. 84 & p. 378.

Growth, in other words, allows for greater social mobility.⁴¹ But, Piketty forecasts, global growth to diminish in the 21st century, which would give greater weight to inherited wealth in determining life prospects, and thereby reduce social mobility. The prospect for entrenched wealth inequality occurs within a global context of immense and growing inequality. According to the World Inequality Report from 2016, the world's wealthiest 1 percent owned about three times more wealth than the bottom 75 percent. The inequality within the top 1 percent is huge, which makes for even more striking comparisons. The world's top 0.1 percent owned twice as much as the bottom 75 percent.⁴² Income inequality is also growing.

Rising global inequality due to economic policy is relevant to the forecasts regarding the *Anthropocene* because the poor are too often most exposed to environmental catastrophes, to the destructive power of climate change in particular. This exposure is the second driver of inequality in the *Anthropocene*. A report from the UN Human Development Programme UNHDP describes the greater impact that climate change has on the poor of the world:

Vulnerability to climate shocks is unequally distributed. Hurricane Katrina provided a potent reminder of human frailty in the face of climate change even in the richest countries—especially when the impacts interact with institutionalized inequality. Across the developed world, public concern over exposure to extreme climate risks is mounting. With every flood, storm and heat wave, that concern is increasing. Yet climate disasters are heavily concentrated in poor countries. Some 262 million people were affected by climate disasters annually from 2000 to 2004, over 98 percent of them in the developing world. In the Organisation for Economic Co-operation and Development (OECD) countries one in 1,500 people was affected by climate disaster. The comparable figure for developing countries is one in 19—a risk differential of 79.⁴³

⁴¹ *Ibid.* p. 85.

⁴² Facundo Alvaredo, et al. *World Inequality Report 2018, Executive Summary*, p. 13. <https://wir2018.wid.world/files/download/wir2018-summary-english.pdf>.

⁴³ UNDP, Human Development Report 2007-08, *Fighting Climate Change: Human Solidarity in a Divided World*, p. 8.

Climate change is one of the greatest threats of the era of *Anthropocene*, and it disproportionately threatens the poor of the world.

Those who are poor are not only most exposed to climate change they also have the least capacity to cope with the impact. Hence, the UNHDP warns of climate change threatening to worsen poverty and to create human development traps.

When climate disasters strike, the poor are oft enforced to sell productive assets, with attendant implications for recovery, in order to protect consumption. And when that is not enough households cope in other ways: for example, by cutting meals, reducing spending on health and taking children out of school. These are desperation measures that can create life-long cycles of disadvantage, locking vulnerable households into low human development traps.⁴⁴

There is an increased risk of human development setbacks in regions of the world in which the poor are especially exposed to climate change, delta regions in east Asia and drought regions in sub-Saharan Africa for example.

The third driver of inequality would be policy failure. Remaining with the example of climate change, in the context of a growing global economy a failure to limit global warming to 1.5°C might not be thought to be that detrimental. After all, by the end of the present century people will be far richer than we are now. Cost not borne by people now will simply be borne by wealthier people later. Waiting looks like progressive distribution of costs across generations. That way of thinking about the matter, however, is fallacious for two reasons. First, to fail to mitigate climate change increases that probability of the climate system surpassing tipping points that might result in ice sheet collapse and rapid sea level rises, massive and sustained drought creating food stress for millions, and the massive release of both CO₂ currently frozen in the arctic tundra and methane frozen in ocean hydrates. Such massive releases could rapidly warm the planet considerably. The second reason for the fallacy is that the

⁴⁴ *Ibid.*

transfer of costs to future generations is not likely to be progressive even short of catastrophes. The reason for this is that mitigation costs are shared, but adaptation costs are not likely to be shared fairly. Mitigation must necessarily be pursued by all, or nearly all, states in order to be effective. This creates the necessity of cooperatively sharing costs. Adaptation to climate change, however, can be carried out by states separately and even by local communities. Generating cooperation is likely to be much harder since success does not depend on it. That raises the higher likelihood that the poor in the future will be left to cope with the costs of adaptation. Rather, delaying costs, then, rather than being progressive is likely to assign costs and suffering on the poor for years to come.

The prospect of the *Anthropocene* as inequalitarian then arises from the poor being more exposed to environmental threats, having fewer resources to cope with a loss, and thereby by falling farther behind in a wealth acquisition regime with rules that in any case disfavor them.

Interpretation as Prospection

Each of the three interpretations attempt to make sense of an ongoing process, one that we are only beginning to understand as in important ways different in both the history of our species and of the planet. Because the interpretations are to a large extent exercises in prospection, no fact of the matter will settle the question of which provides the best understanding. That remains to be seen. They are partially rivalrous. It is difficult to see how the Promethean and the destruction interpretations could both be mostly true, although the destruction and the inequalitarian interpretations seem complementary. Reality will, no doubt, be much more complicated and nuanced than

anything I have offered here. And it may combine some elements of all three of these interpretations. Perhaps even that's the most likely scenario.

What's the point of considering reasonable scenarios regarding the future? To some extent considering the future is something that we can't avoid. It seems to be a feature of our practical reason. Peter Railton argues that it is due to our evolutionary heritage that we come to have a capacity for prospection that we can't help but exercise.

Food deprivation can give a creature hunger and a physiological urge to eat, but anticipation can intelligently regulate motivation to enable a creature to avoid hunger in the first place...Competition, too, favors anticipation. Predators that are better than their prey at anticipating the other's movement will have a critical advantage...And coordination and cooperation can equally benefit from anticipation.⁴⁵

It seems highly plausible that the capacity to anticipate the future was advantageous for our ancestors, and that it was therefore bequeathed to us by those who survived. We may also have further exercised and developed this capacity through cooperative activity. Would-be cooperators weigh the immediate benefits of defections against the future reputational losses that will diminish the prospects of further cooperation.⁴⁶ The capacity to exercise prospection would have helped individuals to survive in cooperative efforts. And cultures of cooperation with imagined narratives may have developed as functional to cooperative enterprise. Images of the future, then, would arise as something constructed to support certain cooperative projects and to deter other projects. Individual planning requires a shared understanding of certain aspects of the future. As Roy F. Baumeister puts it, "There is a real future, but its existence rests on the shared understandings of the social group. We already know that February 2063 will have 28 days, but February 2064 will have 29 days."⁴⁷ We construct the architecture of

⁴⁵ Peter Railton, "Introduction," in Martin E.P. Seligman et al. eds. *Homo Prospectus* (Oxford: Oxford University Press, 2016), pp. 4-5.

⁴⁶ Roy Baumeister, "Collective Prospection: The Social Construction of the Future," in *Ibid.*, p. 144.

⁴⁷ *Ibid.*, p. 137.

the future together, even if we sometimes dwell within it alone. Quite probably prospection is something that we as a species can't not do. It's part of our nature.

That serves to explain the capacity that can be exercised by considering interpretations of the *Anthropocene*, but it doesn't justify the exercise itself. Why consider the direction of the *Anthropocene*? If the exercise, as a piece of prospection, can't track reality, on what basis could one affirm one interpretation over another? It might be useful to distinguish between two structurally similar mental activities. Prediction involves examining past patterns, resemblances to what is presently happening, and estimations of likelihood based on them; it models more or less an ideal of impartial assessment; and it provides reasons to affirm or doubt claims about the future. Prospection, in contrast, is committed; it is an element of our hopes and fears; it is directed towards some aspect of the good or the right (for ourselves or others) to which we are committed; and, when contribution is possible it is a source of reasons to act. That is hope's practical aspect.⁴⁸ Prediction is a piece of theoretical reason, prospection of practical reason.

Prospection is an element of hoping. Ernst Bloch contends that it is pervasive in our mental life. "[E]verybody lives in the future, because they strive, past things only come later, and as yet genuine present is almost never there at all. The future dimension contains what is feared or what is hoped for, as regards human intention, that is, when it is not thwarted, it contains only what is hoped for."⁴⁹ The prospection that features in hope, according to this account, may take the inchoate form of day dreams. "As long as a man is in a bad way, both private and public existence are pervaded by daydreams,

⁴⁸ In "Hope as a Political Virtue," *Philosophical Papers* 35 (2006): 413-433 I argue that standardly hope has a practical aspect that involve taking the likelihood of the outcome and its desirability as a reason to act.

⁴⁹ Ernst Bloch, *The Principle of Hope* vol 1 (Cambridge, MA: The MIT Press, 1986), p. 4.

dreams of a better life than that which has so far been given him.”⁵⁰ Or it may take the form of carefully devised strategies directed towards the highest political good. “Ideals like freedom and also equality act as means to this end, and derive their value-content...from the highest good in socio-political terms.”⁵¹ Because these three interpretations of the *Anthropocene* are bound up with fundamental human interests, they involve prospection. The interpretations matter because they are about what matters to us.⁵²

It is possible to distinguish two different ways in which what we hope for matters to us, and therefore to distinguish two different kinds of hope.

Interested hope involves prospection regarding an outcome because one has an interest in it or would benefit from it.

Moral hope involves prospection regarding an outcome one believes would be a moral improvement or the best among only bad possibilities.

A bet can turn a disinterested observer of a sporting match into an interested and hopeful one. Analysts may offer election predictions; partisans typically possess moral hope; and politicians may have a mixture of interested and moral hope. In all cases the hopes are evidence-relative, and are subject to criticism on grounds of both insufficient evidence and inappropriate ends.⁵³

The three interpretations that I have offered are all, I believe, plausible. There are various possibilities for how things might unfold. Possibility is the modality of the

⁵⁰ *Ibid.* p. 5.

⁵¹ *Ibid.*, p. 173.

⁵² Martha C. Nussbaum sees hope as emotions, and she argues that emotions are *eudaimonistic*. See *Upheavals of Thought: The Intelligence of Emotions* (Cambridge: Cambridge University Press, 2001), pp. 30-31. While remaining agnostic on whether hope should be understood as an emotion, my claim here is broadly consistent with hers that it is *eudaimonistic*.

⁵³ See my “Hope and Reasons,” unpublished. On evidence relativity see Derek Parfit, *On What Matters* vol. 1 (Oxford: Oxford University Press, 2011), p. 150-51.

interpretations. The events comprising the interpretations will be of major historical significance. In this unfolding of things, we are, and will be, both observers and participants. We may observe and make dispassionate predictions, engage in interested prospection, or engage in moral prospection. Some will study the events; some will make investments; some will demonstrate and vote; and others will engage in some combination of these activities. For those who understand what is at stake for humanity will not be able to avoid having moral hopes.

Are moral hopes regarding the *Anthropocene* well-founded? This is best thought of as two distinct questions. On whom does the burden lie, the one hoping or critic of hope, when it comes to assessing whether hope regarding the *Anthropocene* is well-founded? And what is the standard regarding the evidence that would have to be satisfied in order to find the hope well-founded? This first question is sometimes ignored, but it is certainly relevant since it has to do with the epistemic responsibilities of those who hope.⁵⁴ Since hope gives us a reason to act in pursuit of that which we hope, and given the importance of the end, generalized human prosperity achieved within the constraints of sustainability, intelligent action in pursuit of it is very important. So that would seem to suggest that there can be little wrong with people having a reason to act in pursuit of that end. But a presumption in favor of encouraging action depends not only on the goodness of the end, but also on the opportunity costs of its pursuit. But again, there would seem to be nothing lost of great importance to basic human interests to the pursuit of this end. Insofar as placing the burden of evidence provision on the critic of hope would be more permissive of action in pursuit of the end, it seems in this case that it should be placed on the critic.

⁵⁴ I discuss this question in more detail in "Reasons and Hope."

What would the critic have to show to establish that hope is not well-founded? According to Kant the burden is quite high. The critic would have to show that the end is impossible. Kant famously argued that mere possibility is enough to establish the grounds of hope.

It is quite irrelevant whether any empirical evidence suggests that these plans, which are founded only on hope, may be unsuccessful. For the idea that something which has hitherto been unsuccessful will therefore never be successful does not justify anyone in abandoning even a pragmatic or technical aim...This applies even more to moral aims, which, so long as it is not demonstrably impossible to fulfil them, amount to duties.⁵⁵

The plausibility of the Promethean interpretation suggests that the critic would be unable to meet the demanding threshold of demonstrating the interpretation to be impossible. But, Kant's claim to the contrary notwithstanding, that might simply be too high a threshold in any case.

Assigning subjective probabilities to the three interpretations might lead many to think that the Promethean is the least likely of three interpretations. But the matter can't stop there since hope need not be directed towards what is most likely. In fact, it might seem most important in its practical aspect when it is not. So, even if the Promethean interpretation is least likely that doesn't render hope in it ill-founded. Any argument that the hope is ill-founded would probably have to appeal to a combination of low probability and high opportunity costs. But insofar as the opportunity costs are not high, then presumably the threshold of evidence-relative probability can be quite low. Hope for the Promethean interpretation, then, would seem secure.

⁵⁵ Immanuel Kant, "On The Common Saying 'This May Be True in Theory but it does not Apply in Practice'", in H. S. Reiss ed. *Kant's Political Writings*, p. 89.

Concluding Remarks

I have argued that there are three plausible interpretations of the *Anthropocene*. These interpretations can't simply be settled by the facts since they concern the direction in which things might develop. They are not mere predictions, however, since the concern matters that we have good reason to care about, the future well-being of humanity. Our moral hope is direct towards that. It should be an end of our hopes and our actions. The fact that nothing of great moral importance is lost by our making it such an end is relevant and supports two further claims. One is the claim that the burden of showing that this hope is ill-founded rests on its critics; those who hold this hope are justified in doing so, unless the critics demonstrate otherwise. The second claim is that the evidential threshold that would have to be shown to rationally convince those hoping that they should not hope is very high, even if not as high as showing it to be impossible. It seems doubtful that the end could be shown to be tremendously implausible. We might not be strongly optimistic that massive destruction and deep inequality can be avoided in the epoch of the *Anthropocene*, but we certainly seem to be licensed in hoping that they can. And that hope may help us to do what we need to do to increase the likelihood of the best outcome.