

Post-economics: Reconnecting reality and morality to escape the Econocene

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Planet Earth is now experiencing more rapid environmental change and greater extremes, clear indicators that humanity faces a challenging if not grim future. Unfolding in real time before our eyes are the staid forebodings of five assessments by the Intergovernmental Panel on Climate Change and the urgent warnings of natural scientists (Hobbs and Cramer, 2008; Beach and Clark, 2015; Bradford et al., 2018; Vosen, 2020; Ripple et al., 2021).¹ In California, from where I write, the Sierra Nevada Mountains had a historically low snowpack in 2015 that was unprecedented in the last 500 years while 2010-2020 also included some of the largest snowpacks on record. Amidst rising temperatures, the summer of 2020 was unusually hot across California and included the highest temperature reliably recorded on earth: 130°F (54°C) in Death Valley in August. During 2020 California had five of its worst six fires in all of recorded history. This year, 2021, is another drought year, and the residents of the Berkeley hills received their first “Red Flag” prepare-for-evacuation fire warning in early May. Rising temperatures, longer droughts, extremely wet years, and unprecedented wildfires in California are raising public awareness that the future will likely be increasingly difficult. With a rapidly changing and variable climate, the ways in which we think about and manage energy, water, agriculture, and forests are changing significantly, yet old ways of thinking tied to the prior coevolution of understandings of reality and social organization persist and slow our response (Norgaard et al., 2021).

Thirty years ago, the global community of climate scientists was a few thousand. Today the community is orders of magnitude larger and blends into multiple millions more as environmental and energy scientists have restructured their research, engineers design new technologies, architects have adapted their designs, policymakers and planners have reconsidered public options, and managers have rethought how to engage with the realities of climate change. The scenarios of global integrated assessment models help inform national and regional models that guide the patchwork quilt of national, regional, and local climate adaptation plans. At the same time, local and regional phenomena raise questions about the dynamics of the global system. As we try to understand and respond to the diverse, interacting ramifications of climate change, we are beginning to see a dynamic, polycentric process of interactive learning and preparing for likely futures of Planet Earth.

Global environmental change is the greatest challenge humanity has ever faced. It is an existential challenge. Yet economists are notably absent in the mobilization to confront and work with it. William Nordhaus (2019) has encouraged economists to get involved. Andrew Oswald and Nicholas Stern (2019), on the other hand, document that the most cited economics journal, the *Quarterly Journal of Economics*, had yet to publish an article on climate change and that economics students rarely find the forecasts of global climate

¹ This article draws on my engagement in the Millennium Ecosystem Assessment and the 5th Assessment of the IPCC as well as a decade assessing the adequacy of environmental science to water policy while serving on the State of California’s Delta Independent Science Board. This article complements and builds on Norgaard (2019) where some of the arguments here are more thoroughly explicated in my coevolutionary framework (Norgaard, 1994). There is some redundancy between this paper and Norgaard (2019) so that this paper can stand alone.

science included in their classes. Stephen Polasky et al. (2019) argue that the economics profession is simply not structured to address the greatest existential crisis of all time. They note that in 2018, the American Economic Review had but two articles that focused on any aspect of energy, environment, or ecology. For earthly matters, there are specialty journals. Though classical economists tried to speak to the material realities of land and agriculture (Schabas, 2007), neoclassical economists work in precise equations of socially constructed abstractions whose complex histories they avoid exploring (Hodgson, 2016). In short, mainstream economists, and many economists in lesser streams, and those stuck in eddies as well, have become detached from the realities of Planet Earth.² Steve Keen (2020) argues that the few economists who are trying to address climate change are still doing a dismal job at characterizing and developing responses to the existential threat of climate change. Keen's assessment echoes those made more than a decade earlier by DeCanio (2003), Baer (2007), Weitzman (2009), and Spash (2010) with respect to the difficulties of incorporating a likely catastrophe for future generations into a tradition of utility optimization within the conceptual guardrails of market thinking. Optimizing dominates prescriptive economic analyses. Resilience thinking to sustain safe operations now dominates non-economic policy discourses, corporate planning, and personal strategy advising.³ Economies continue, but the economics profession and supporting economic beliefs are losing their relevance, and in this paper I argue that that is a good thing.

The Covid-19 pandemic has documented how poorly markets alone are prepared to respond to big surprises and uncertain futures. And yet, at the same time, with the help of government research and policy interventions, community ingenuity, and individual resilience and suffering, economies have not collapsed. Furthermore, in spite of viral, insane conservative denialism, debates about reality and morality with respect to the pandemic, black lives, indigenous peoples, immigration, gender equality, and elevated suicide rates among other topics rage in social media and political discourses. In spite of the considerable dysfunction of current modern societies, people have somehow been cooperatively muddling through the Covid-19 pandemic amidst other social issues just well enough. It appears that most societies are likely to come through the pandemic though their economies will also be modified by it.

For a little over a century, a mere blink of the eye in human history, western and westernized leaders, politicians, policymaker, and the public have operated on the belief that there can be a scientific discipline of economics, a field of study separate from moral philosophy and the natural sciences. Never mind that economics coevolved with a political discourse driven by power. Economics seemingly explains how society should be organized and people should live. The modern economic world arose around ideas generated by economists, and this

² Detachment from natural realities seems to have become characteristic of social scientists in general, not just economists. The environmental subdisciplines of history, sociology, and political science as well as in Marxist thought arose well after the subdiscipline of environmental economics. One striking example pertinent to this essay, historian Nathaniel Wolloch (2017) in his "Nature in the History of Economic Thought" mentions climate change in the second sentence of his Preface, noting how environment is now much in the news, but he never comes back to this existential crisis and how it might tie into the utilitarian view of nature and the idea of progress he so heartily supports in his history of economic thought.

³ Over the last decade, the term resilience and its variant have increasingly appeared, from advertisements to serious analysis, with respect to making a decision, seemingly regardless of the type of decision presumably due to increased anxieties about how to deal with the uncertainties of the future. Serious academic thinking on resilience can be found in the many good publications of the Stockholm Resilience Centre, <https://www.stockholmresilience.org>.

world has been supported by corresponding public economic beliefs that I refer to as “economism”.⁴

Economism has been modern capitalism’s myth system, or in computer parlance, capitalism’s operating system. It has stressed utilitarian moral beliefs compatible with economic assumptions that are critical to neoclassical economic theories. These beliefs include the idea that society is simply the sum of its individuals and their desires, that people can be perfectly, or at least sufficiently, informed to act rationally in markets, that markets balance individual greed for the common good, and that nature can be divided up into parts and owned and managed as property without systemic social and environmental consequences (Norgaard, 2019). Especially after World War II when the industrialized nations globally organized around economic beliefs and set out to spread their economic systems among less industrialized nations, these simple beliefs steadily displaced more complex moral discourses of traditional religions (Cobb, Jr, 2001). Economism has facilitated climate change and other anthropogenic drivers of rapid environmental change. Natural scientists are labeling current times the Anthropocene. I advocate using the term Econocene since our economic beliefs, both moral and those with respect to reality, and the econogenic drivers they facilitated have been critical to the rise of rapid environmental change. Furthermore, the term Econocene alludes to the current social and technological structures and human capital that are sustained by economism.⁵ Escaping the Econocene will require dynamically, polycentrically, reconnecting reality and morality writ large.

I have invoked the terms “reality” and “morality” several times and will do so many times again as if people, whether individually or collectively, were able to comprehend reality and morality directly. I have no doubt that reality will remain elusive. I do not imagine people comprehending the changing details and dynamics of natural systems, as well as the combined complexities of natural and social systems interacting. Nor do I imagine people mastering the long and diverse discourses on morality, as if there were no limits on human understanding. Of course, there are limits. We need to be continually humbly aware of our limits (see for example DeCanio, 2013). And so I am advocating that morality and reality need to be actively discussed, not things long lost in economic fables. Morality and reality have long been ignored in the vague units of analyses precisely presented in the mathematics of economists. It is time to listen to scientists and moral philosophers and to have more people entering into informed, reasoned debate.⁶ A key point of this paper is that we need to remove the constructed narrow conceptions of morality and reality associated with the economics and economism that have brought humanity and the planet to the brink of disaster and into centuries of rapid change.

⁴ Other scholars have used this term, all somewhat differently. I add a unique argument to the term economism. It is not simply the beliefs of economists or the beliefs they push on the public. Rather, people have a need for explanations of the economic cosmos in which they live and answers to how to behave that economism fills much like religion in the past..

⁵ Many social thinkers have found that the term “Anthropocene” blames people in an inappropriately inclusive yet nondescript way that does not inform action. Capitalocene, Technocene, and other alternatives that have been put forward and the swirl of arguments initiated by Malm and Hornborg (2014) are reviewed by Lopez-Corona and Magallanes-Guijon (2020).

⁶ Because modern ways of knowing are fractured, I have long advocated methodological pluralism (Norgaard, 1989). My historic concerns have been updated for the Econocene (Goddard, Kallis, and Norgaard, 2019). With the multiple perspectives on reality and morality that we have, reaching shared understanding through expert discussion and public discourse is the only option. I am concerned that such a process will work, let alone work fast enough to reach shared understandings rapidly enough in a future of rapid change.

Such a dynamic environmental and social future raises a key issue stated most effectively by Yuval Noah Harari (2011, p. 30):

“Any large scale human cooperation – whether a modern state, a medieval church, an ancient city or an archaic tribe – is rooted in common myths that exist only in people’s collective imagination.”

Neoliberal economics and its supporting economism is simply a specific belief system, albeit one that has sustained unusually viral, imperial claims. Its demise and replacement with another economic belief system, however, will only briefly suffice. Due to historic and ongoing econogenic drivers, our options for acting within natural, social, and moral systems will keep changing, leading us into less known to totally unknown territory in all three systems. Operating in a world of more rapid and unpredictable change will require frequently changing our provisioning system and supporting culture. The democratic challenge is to acquire a widely shared public myth system that connects moral, social, and natural systems while also continually adapting to rapid change.

My argument unfolds as follows. Section I, “connectedness lost”, summarizes how human understanding has historically melded reality and morality, how the fragmented nature of current hegemonic human understanding arose, the consequences of fragmentation, and how fragmentation has been endured. Section II, “economics: a weakly anchored bridge” argues that economics has played an unusual role, as theory and as belief system, in bridging reality and morality, though only weakly anchored in either of them, to facilitate market organization and social decisions in the midst of knowledge fragmentation. Section III makes the hopeful case that society can directly link reality and morality in order to escape the Econocene. This would entail the demise of economics as the dominant way of thinking about public choices, corporate responsibility, and personal behavior. It also raises new questions about how consensual, learning, adapting societies might organize under rapid environmental change. Section IV concludes by noting hopeful signs within the remaining plurality of cultures and new visions that could help humanity through the coming centuries.

I. Connectedness lost

The Econocene arose because of the disconnects in human understanding between reality and morality. It was not always so. Early people learned through experimentation, accidental and purposeful, that they could hunt more successfully when individuals cooperated and coordinated their efforts. Cooperation works best when each has trust in how one’s fellow hunters will behave under different situations, and trust evolved into moral expectations. It also made sense for hunting parties to share their kill with others in their group, for some hunting parties were more successful one day, others the next. Children and elders needed food too. Hence, from the earliest of times, human provisioning and moral behavior have been tightly fused.

Hunting for meat as well as gathering vegetal foods involved working with the intricacies of nature. People became aware of the timing, location, behavior, and co-occurrence of different species. They evolved stories through experience about how to successfully interact with nature. Some stories improved hunting and gathering techniques. Less “true” stories were retold less frequently as they were less likely corroborated in practice, and some were eventually forgotten. Early people’s earthly stories entailed timing, and the timing of natural

events could be tied to the positions of the sun and the constellations. Existential myths evolved into stories connecting the techniques and ethics of people's earthly existence to the cosmos above. Moral, social, material, and existential stories intertwined in traditional knowledge and facilitated social organization and collective and individual behavior.

The rise of agriculture and early hierarchical societies with kings, priests, and wise men required new ways of civilizing consciousness to rationalize the tedium of planting, weeding, and harvesting and rationalize why a few men were wise while the vast majority of men and women were workers. The religion supporting the provisioning system, then as now, rationalized authority and inequality, yet morality and reality intertwined sufficiently in agricultural societies to sustain human existence for millennia. Now, after only several centuries of corporate industrial capitalism, humanity faces a global existential crisis.

In Europe, Galileo's findings began to challenge the Catholic Church's authority to explain the celestial cosmos. Western understanding and consciousness transformed dramatically through the Renaissance, Reformation, and multiple Enlightenments across Europe. Historic Christian hopes for moral progress transformed into expectations for ever-increasing human understanding, technological progress, and control over the vicissitudes of nature (Bury 1920). The unity previously assured by God's design, creation and management of planet Earth transformed into expectations for the unity of human knowledge. Luther's argument that everyone was responsible for reading and interpreting the Bible and finding God themselves contributed to the rise of modern ideas about education, individual choice, responsibly learning and thinking for oneself, political authority, and governance, ideas crafted most notably by Hobbes, Locke, and Rousseau (Ryrie, 2017). Also in this period, the Catholic Church had the hubris to claim authority to convert the peoples of Europe's new world to Catholicism even if it killed them. The Church's hubris transformed into enlightened hubris and then capitalist and socialist hubris with respect to transforming or killing other cultures in the name of developing them.

Yet until early in the 19th century, merely two hundred years ago, an effort to intertwine reality and morality still existed in natural theology, the project to understand the character, will, and operating manual of God through the study of nature. Isaac Newton was both an accomplished moral philosopher and a path-breaking natural philosopher (Ilfie, 2017). The Physiocrats made moral arguments about who should be taxed based directly on what they understood to be physical realities (Schabas, 2007). Adam Smith wrote a treatise on astronomy to document his knowledge of natural systems before writing moral philosophy (Ross, 2010, chapter 7). Well into the 19th century, both natural and moral philosophy students as well as students of theology, medicine, and law studied William Paley's "Natural Philosophy, or Evidences of the Existence and Attributes of the Deity collected from the Appearances of Nature" (Paley, 1835 and earlier editions). In 1874, social philosopher and economist John Stuart Mill intertwined the science of natural laws and natural religion (Mill, 1874). Morality and reality intertwined in the minds of European intellectual elites during the rise of disciplines in the latter 19th century. Then, not only reality and morality became separated but they too were broken into multiple disconnected compartments of western understanding. The creation of disciplines, specialized realms of knowledge, implicitly entailed the assumption that the linkages between disciplines were sufficiently weak that, for "practical" purposes, they could be ignored. Pure reason combined with empirical evidence in the style of Newton's physics was only practical by assuming reality could be divided into parts. It was in this historical context that the 20th century idea arose that economics could be a separate field of human understanding.

The disconnectedness of Eurodescendant understanding has been endured in the faith that, with sufficient scientific progress, the separate disciplines will ultimately merge into a unity of knowledge, a single clear vision of reality, somehow accessible to all people (Millgram, 2018). Equally importantly, the belief arose that values could exist apart from facts, separating morality and reality. Yet western science continued to progress into finer and finer compartments, and the limited evidence of their fitting together into one structure ought to test intellectual faith in an eventual unity. And the directions western learning took, which areas of knowledge were delved into more deeply, has clearly reflected technological possibilities with lucrative private market opportunities rather than the promotion of community, caring, and what made for a meaningful life. As corporate industrial capitalism arose,⁷ new technologies were developed and deployed that were based on compartmentalized understanding that transformed society and nature in unexpected ways. These technologies were successful within their particular compartments. Material well-being increased in the short run, but because nature and society are not compartmentalized like the disciplines and technologies and ways of socially organizing they brought forth, social and environmental systems were breaking down in the longer run. In the process of going from an agrarian nation to a corporate industrial one, traditional moral teachings required more and more translation to relate to the world people were trying to understand. This created a need for new, more relevant moral beliefs that was filled by economism.

Fossil fuels provide the most important and clearest example of this process of specialized knowledge and technologies transforming people and the planet. The scientific research and technological developments that facilitated the exploitation, processing, and use of fossil fuels vastly increased people's ability to move around; heat, cool, and light homes and offices; and power mining and industry. Fossil fuels provided fertilizers and pesticides, pumped water, and fueled farm equipment that intensified farm production and extended agriculture to land of lower fertility. The productivity gains from fossil fuels supported public education, research, and additional technologies, playing a key role in the social and environmental transformations to the world we now have. Though coal miners lived short, brutish lives, faith in human progress surged in the 19th century with the combustion of coal for steam-powered factories, trains, and boats. Contemplating these developments from America, William Bancroft gave a lengthy, enthusiastic oration before the New York Historical Society in 1854 titled: *The Necessity, The Reality, and The Promise of the Progress of the Human Race*. The initial incredible success of the age of fossil fuels led many to believe—the public, natural scientists and engineers, and especially economists – that technological progress was easy and inevitable (Malm, 2016). Bancroft's confident progressive bombast was echoed 120 years later in the technologically optimistic and sharp dismissals by economists (Beckerman, 1972; Kaysen, 1972; ul Haq, 1972; Solow, 1973) of *The Limits of Growth* (Meadows and Meadows, 1972). Economists have had difficulty facing the existential nature of climate change because they tend to have a deep faith in progress and an uncanny ability to characterize bad outcomes as minor costs of progress.

There was only one problem with fossil fuels, a very big one. By combusting fossil fuels, modern economies released carbon back into the atmosphere, reversing the very processes that over millions of years had made Earth habitable for other species and eventually people. Svante Arrhenius warned western civilization of this terrible consequence of fossil fuel

⁷ Let me simply acknowledge that a rich interweaving of the history of the European idea of a corporation is needed here but I am already challenged interweaving as much as I have in a single essay.

technology at the beginning of the 20th century, but as knowledge specialized his global understanding and predictions were effectively forgotten for half a century (Weart, 2008). Because Arrhenius' knowledge was not broadly known among natural scientists and updated given actual greenhouse emissions, industrialized nations emitted vast amounts of carbon dioxide and other greenhouse gases until disaster loomed.⁸ Now, the risks and uncertainties of global environmental change present immense scientific, technological, and organizational challenges in times of great social inequities, loss of public trust, and the deliberate generation of misinformation. And these social breakdowns have also been a part of the larger transformations associated with fossil fuels and over-reliance on markets and the economic beliefs that have supported these.⁹

II. Economics: a weakly-anchored bridge

Through this splintering, yet systemically transformative, history that we now know was leading to the environmental, social, and moral challenges of rapid change and human existence itself, economists managed to portray their discipline as both bridging to reality and bridging to morality. Scholars within other disciplines who have claimed to bridge reality and morality have quickly been dismissed by the academic community as having gone beyond their expertise and moved into populist fantasy. Yet, economists as a whole have been able to play this bridging role. Changing metaphors, I am arguing that economics has been a splint to fractured western understanding, extending the disastrous period of applying disparate knowledge by seemingly holding reality and morality together.¹⁰

The weak anchor in morality is clear. Economics has operated as an objective science promoting how society should organize around markets and has provided a methodology for choosing between public options derived from market values. Complicated moral issues of how individuals should behave in an increasingly complex provisioning system could be ignored because economics has prophesied how markets balance individual greed for the common good. Existential questions related to the meaning of life have been reduced to consuming more than thy neighbor. Similarly, the purpose of nations has been to promote economic growth. Caring for others and supporting one's community were fine if they gave one pleasure, but economic morality denies any need for commitments or obligations to sacrifice on behalf of others. Nor has anything been sacred except property, liberty, and the freedom to choose between whatever could be marketed.¹¹ Economists have periodically documented how trust and truthfulness support markets and other forms of social organization by reducing transactions costs (Arrow, 1974; Sen, 1977; Wade, 1992). Yet virtues like trust and truthfulness, the role of communities and care, or even why corporations exist have rarely been raised in freshman principles or graduate theory courses. Utility maximization and the incentives to choose well provided by market prices have been the whole story.

⁸ The fossil-fuel driven economy and market mythology also facilitated the expansion of markets to full globalization, interconnecting ecosystems and reducing biodiversity and resilience across systems (Norgaard, 1988).

⁹ There is a vast literature on capitalism and democracy and arguments in favor of democratic capitalism as an alternative to the corporatocracy that exists.

¹⁰ I have simply touched on another major issue. In an American context, Robert Nelson (2016) touches on the reasons this has come about and the contradictions it presents for thoughtful policy analysts.

¹¹ These are my own short summaries after five decades in the field and considerable reading. Herman Daly (2016) provides more elaborate and complementary reflections.

How economics has been only weakly anchored in reality is more difficult to document. The anchor has been mostly implicit. Behind every policy prescription have been implicit assumptions or beliefs about reality. In the United States, economists were blinded to the reality that the 2008 financial crisis was a bubble fed by a false belief because they were confident that markets were self-correcting and were not bothered that borrowers and lenders reverberated the belief that housing prices would only go up (Desai, 2015).

While most of the ways economics connects to reality have been implicit, there has been one clear example, the question of long-term resource availability for future generations. For this existential question, economists supposedly determined the nature of reality, indeed all future realities, through pure economic reasoning and market evidence. By looking at the history of capital and labor costs to extract resources, Barnett and Morse (1963) argued that resources were becoming easier to extract and therefore effectively more abundant. They turned Francis Bacon's hope that science would conquer nature into a supposed fact to support using resources without constraint.

“The scientific age differs in kind, and not only in degree, from the preceding mechanical age. Not only ingenuity, but, increasingly, understanding, not luck, but systematic investigation, are turning the tables on nature, making her subservient to man” (Barnett and Morse, 1963, p. 10).

All humility before the complex interconnections and intricacies of nature were lost. Patriarchy reigned yet unchallenged. There was no possibility for a surprise such as climate change. And, of course, Arrhenius had already warned of this disaster; western science was simply not capable of keeping its own understandings connected in the minds of scientists.

Barnett and Morse spawned a flurry of improved analyses over the following decades that generally reached the same conclusion, resource scarcity had not limited growth and likely never would, though the environmental impacts of resource extraction tempered later analyses (Krautkramer, 1998). These economic analyses of the race between technology and resources stocks contained data on neither technology nor resource stocks. They confused the cost of extracting resources with the stock of resources remaining. In addition, the most sophisticated theoretical model of the cost of resource use over time (Hotelling, 1931) to which later scarcity analysts appealed assumes that resource extractors were perfectly informed of 1) the total stock of resources available on the planet, 2) the technologies yet to be invented to extract them, and 3) all future demands for the resource. But if resource extractors were already perfectly knowledgeable of resource stocks, future technologies, and future demand, it would make more sense simply to ask them whether resources were scarce rather than look at the history of extraction costs. If they were not so informed, the economic indicators would be falsely derived and nonsensical (Norgaard, 1991). Economists have become unhinged from reality.

Economists' own limited understanding and false portrayal of their discipline corresponds with their efforts to reduce reason to mathematical models, market data, and econometrics. When that is not possible, they pretty much ignore any discrepancies from reality and morality. Two discrepancies are evident.

First, in the 19th and early 20th century, mathematical moral philosophers – from Cournot to Pigou – formalized how supply and demand interact in a multi-market economy and determined that there were multiple efficient market solutions depending on how the rights to

assets – land, capital, and human understanding – were distributed among the population. Which people have rights to how many assets determines who has how much income and thus how shares of the economies provisioning of goods and services are distributed among members of society. This is the central link between economics and morality. In hunting and gathering societies, one's rights to an appropriate share of the provisioning process is critical to how well the tribe fairs. Deprived people are poor provisioners. The connection between efficiency and distribution is still a fact explained to economics students. The relationship, however, is condensed to the first and second theorems of welfare economics, terminology that certainly looks like "pure reason".¹² In practice, however, the broader implications of the second theorem have almost been completely ignored. As a result of inappropriate policies in real economies, the distribution of who gets what has become increasingly immoral. Yet, until the inequities became really extreme, whenever an economist simply pointed out the possibility of efficient economies based on different asset distributions, they were chided for switching from being an objective scientist to being a political advocate. At the same time, economists advocated policies based on what would improve the efficiency of the current economy which has surely been no less political.

Another way of arguing this is that the logical connections of economics to morality have been lost as economists try to defy the "is-ought fallacy". They repeatedly deduce what ought to be done using values derived from the societally and environmentally destructive economy that is.

Second, natural scientists in the latter 19th and early 20th century argued that how economists formulate production possibilities and economic growth ignores the first and second laws of thermodynamics (Martinez-Alier and Schlüpmann, 1987; Baumgartner et al., 2001).¹³ In addition, as the field of ecology arose, the scientific documentation of the interconnectedness of species, well known to natural philosophers and theologians two centuries ago, was in sharp contrast to the economic assumption of nature's complete divisibility (Norgaard, 1985). In economic thought, nonmarket interconnections between people or between people and nature are described as externalities, supposed special situations. In fact, the connections to social and natural realities are rampant and only external to the economic mind. Disciplines need assumptions, belief systems need myths, yet reality has ways of intervening. Climate change is one of those and in a big way.

The fragmentation of human knowledge over the last century and a half is the primary cause of the current human predicament and humanity's greatest obstacle to moving beyond it. We know much about many particular parts of the whole in great detail and little about how the details fit into a system and interrelate let alone connect with morality. The fragmentation of knowledge brought on the breakdown of planetary, social, and moral systems. Fragmentation impedes our ability to understand our global situation. And fragmented knowledge will be of

¹² The 1st theorem notes that in a system of perfectly competitive markets, each party in a transaction is better off, the essence of Adam Smith's invisible hand. The 2nd theorem points out that there are many perfectly competitive efficient solutions depending on how rights to land, capital, and education are distributed among people. This is the critical point, but this law is frequently stated in such an obtuse form that its distributive importance is lost, likely deliberately so. In contrast, during the 1960s, I was taught the essentials of welfare economics through Francis Bator's 1957 article titled "The Simple Analytics of Welfare Maximization". Bator fully laid out, with appropriate "hand waving" where the mathematics was still weak, how different distributions relate to the well-being of different parties, as well as the fact that the social welfare function was a moral issue outside of economics.

¹³ The original analyses of Barnett and Morse (1963) of the race between new technology and resource scarcity failed to include energy use in resource extraction, the very driver of the technological revolution that facilitated lower grade resource extraction.

little help escaping the Econocene. Within the splintering history, economic thinking lost its own connections to morality and reality while ironically being able to portray itself as objectively connecting them.

There has been another very important process going on as well. Economic beliefs, or economism, held and appealed to by economists, policy analysts, and politicians and held by the public became syncretic with Christianity. In many ways economism replaced parts of earlier Christian and other religious traditions. Frank Knight proclaimed nearly a century ago that economic thinking had to be believed in like a religion and few should question its tenets (Knight 1932). While few economists ever read this article by Knight, his commandment was effectively brought to pass. Economism explains the rise of the Econocene and rationalizes the economic cosmos in which people live. Economism promotes individual greed over care for others, and equates a meaningful life with energy use and material accumulation greater than thy neighbor (Norgaard, Goddard, and Sager, 2017). Economism fills the need in Euro-descendant psyches for moral and material understanding that traditional knowledges have filled in hunting and gathering societies and formal religion has played until the rise of science, fossil fuel technologies, and corporate industrial capitalism in the 19th century.

The problem is that the Eurodescendant evolving economic myth system has contributed to a disaster for people and the planet. To escape the unfolding misfortunes of the Econocene, at whatever stage we can, we need to abandon our past myths and the economic structures it supported. This will entail great costs for those who have benefitted the most from the past myths: especially capitalists invested in fossil fuel resources, technologies, and infrastructures. At the same time, the poor who are dependent on the current system but without the wealth needed for a secure transition will also be severely hit unless very significant redistribution policies are put in place.

That bad western economics has brought all of humanity and nature to the brink of disaster is a core argument of ecological economics. The argument presented here is an elaboration on this core, one that emphasizes the role economics and the economic beliefs that support it appear to have played in providing a bridge between reality and morality amidst fragmented knowledge. In this weakly anchored bridging role, economics and economic myths justified and extended the unfolding disaster of fragmented knowledge and its associated technologies and ways of socially organizing.

III. Provisioning during rapid, uncertain change

Given this explanation of how the human predicament arose, what does it suggest for responding to a rapidly changing and uncertain future?¹⁴ Many environmental scientists

¹⁴ I struggle here as to how to characterize scientific understanding of the future. In my way of understanding, all systems – ecosystems, hydrological systems, climate systems, weather systems, etc. – are scientific constructs that have helped us think and understand, yet they do not exist in nature. Conceptual systems have boundaries that we have put on nature that do not actually exist in the continua we mostly find. There are also different ways of hypothesizing how things interact within a system, for example species interacting in a food web or species interacting and coevolving in a food web in response to external disturbances. While systems thinking is more systematic than thinking, for example, about the characteristics of an individual species, systems thinking necessarily still has artificial boundaries. The areal boundaries of ecosystems are constructs of the mind and need to be chosen strategically with respect to organisms and processes that are central to the analysis (Wiens, 1989). The question in my mind is whether the ways in which we have learned through seeing nature as

predict total environmental systems breakdown as multiple thresholds or tipping points are crossed (Rockström et al., 2009; Barnosky et al., 2012; Wunderling et al., 2021) and planet Earth goes into a hot phase that will be uninhabitable (Steffen et al., 2018). Such tipping point perspectives are difficult to work with because the science of detecting thresholds in environmental systems, let alone socio-environmental systems, before they are crossed is weak (Biggs, Carpenter, and Brock, 2009). The warning from this scientific understanding and its inherent uncertainties are clear: humanity needs to back off from likely brinks as soon and quickly as possible.¹⁵ This is the state of scientific understanding. As when a nation is attacked and war is declared, the appropriate defense policy is not fine-tuned by values derived from the current consumptive economy. Rather, societies in war rapidly alter their economy to serve immediate war needs. Markets and economists play a subsidiary role in war, as they will in rapid environmental change. And if total catastrophe unfolds, economies and economic belief systems will collapse as well. In the catastrophe scenario, there is little role for economics.¹⁶

The catastrophe may, however, be slow enough for us to have sufficient glimpses of the possibilities to come in the future that we may be able to be proactively adaptive. This may better describe the reality we are beginning to experience. I contend that this future will also necessitate abandoning economics as we have known it and reconnecting directly to reality and morality writ large.

Rapid, uncertain environmental change will instigate continual new challenges that can only be met by social changes determined by new and foreseeable realities and moral considerations. Modern fossil-fuel driven economies created a new environmental determinism. Economies must now and for several centuries in the future constantly proactively prepare for the changing environment. But the economics profession will dwindle in importance. The profession has thrived on “the economy tells us so” stories passing as serious analysis that will no longer be possible with the economy rapidly adapting to new and foreseeable environmental conditions.¹⁷ The economics profession has also thrived through stories of progress as economic growth that will no longer be relevant. In the hopeful vision of the future that I am presenting here, policy debates will be about reality and morality writ large.

a composite of systems, typically systems that have equilibria, impedes our understanding now that we are in the Anthropocene, or Econocene.

¹⁵ There were scientists in the early days of climate science who doubted the basic arguments and evidence of the science and expressed optimistic progressive views of the future. Physicists S. Fred Singer, Fred Seitz, and William Nierenberg led the skeptics movement, but these scientists have not been replaced by comparably reputable skeptics in recent decades. I should also note that the scenarios of the IPCC have included less dire futures, but the accumulation of evidence keeps showing the less dire scenarios less likely while more dire scenarios have become more likely.

¹⁶ My argument in this paper and elsewhere is that economic beliefs held by economists and the public are central to the disaster we are in. I acknowledge that scientists who have joined warnings of catastrophe have also joined with economists in articles that have argued for only extensions of economics, staying within the dominant paradigm, as if economics were not central to the creation of the problem in the first place (see for example Polasky et al., 2019 and their references to earlier efforts). Similarly, Kinzig et al. (2013) and Dasgupta (2021) argue for selecting future investments using correct social values that are favorable to conserving environmental systems while only peripherally noting the role of economics in having promoted and continuing to promote inappropriate values for environmental conservation.

¹⁷ Let me be clear, I am not suggesting that “economy-tells-us-so” empirical analyses and public stories were ever appropriate for understanding and reaching the kind of economy we *want* to have. I am merely pointing out that with the economy changing even more rapidly, the analyses and stories will be wrong even more quickly than in the past (Mishan, 1986:83).

With rapid, uncertain environmental change, possible foreseeable conditions will typically be different than they have ever been in the past. There will be no normal. Yet to some extent, future conditions will be somewhat foreseeable. Far more scientific talent will need to be dedicated to trying to understand global to local environmental change. More scientists will be needed to follow the numerous changes at smaller scales and their implications to what we conceive to be planetary subsystems, and the feedbacks between phenomena at smaller scales for emergent phenomena at larger scales. Emergent phenomena at smaller scales, or within particular global systems, will provide clues to larger global developments that will, in turn, feedback on other regional or subsystem processes. The natural science community will be spending far more time looking forward, and interacting and learning across scales, in order to inform how the provisioning process might respond. I can foresee a process of dynamically, polycentrically learning and adapting. Environmental scientists will be spending far less time documenting past details that no longer matter.

Economists advocate free markets over central planning because markets are said to automatically respond to new demand and supply conditions well before central planning bureaucrats even notice them let alone actually do anything. Markets adjust systemwide automatically without complicated economic planning models. Entrepreneurs and investors have an interest in adjusting to changing times, central economic planners do not. Yet during the rapidly changing uncertainties and high risks of war, pandemics, and plagues, nations have consistently moved toward more centralized economic planning to provide overriding guidance to markets. Morality and reality, not markets, must be the primary signaling system as to what should be done.

IV. Hopeful signs

The Covid-19 pandemic provides lessons for the Econocene. The pandemic could have been handled better had more scientists undertaken more research in anticipation of such a global public health threat, if hospitals and other parts of the medical system had not optimized their profit-maximizing capabilities for historically normal times, if pharmaceutical companies had maintained excess and more diverse production capacities, if national and international health agencies had also been better staffed to handle surprises, if businesses, schools, and other organizations had been able to switch to online operation more effectively, and most of all, if people had connected the scientific and moral issues truthfully. Yet the “could have” followed by the many “ifs” of this statement presumes considerably better insight into a changing and uncertain future and a significant transformation toward mindfulness and preparedness for the public good. Great costs have been borne by the poor during the pandemic, especially women and children, and mothers generally bore a greater share of the home-schooling burden. Great costs could have been avoided if reality and morality had been more squarely faced more quickly. Yet thus far, economies, with the help of government interventions, have also been more resilient than they might have been.

In the future, as in the Covid-19 pandemic, provisioning of food, housing, and health will be primary goals through the next two centuries of rapid, uncertain environmental change.¹⁸ As

¹⁸ When I took my first economics course six decades ago, the professor explained that the common notion that there are primary, secondary, and tertiary sectors was nonsense. Every sector is interdependent with every other, and he noted how farming requires industry to provide tractors and fertilizers. And, of course, a dollar spent on fine jewelry by the rich was the same as a dollar spent on food by the poor.

in the pandemic, provisioning workers will be deemed essential and a policy emphasis will be on assuring their success. The pandemic demonstrated that the economic myth that additional income to billionaires trickles down has lost its charm. Because droughts, floods, and pestilence will be more common, yet their exact locations not easily predicted, there will be much greater need for redundancy in the provisioning system. More land will need to be allocated to food production, for example, given that under rapid, uncertain change there will be a lower likelihood that any particular area will have the environmental, agricultural, and social conditions needed to be productive. Similarly, specialization in tasks will be less pronounced as experts and laborers will broaden their skills to meet emergency and newly emerging needs. As in the pandemic, the right to food and health care has been debated quite directly on real and moral terms and less using economic arguments. As in the pandemic, people and businesses will be more flexible with respect to how and where work gets done. Long term contracts will be few to assure flexibility. Medical care systems, including hospitals, will be less fine-tuned to optimally handle the conditions of the past. Perhaps the mix of corporations will shift toward smaller adaptive businesses. Public policies will seek to maintain a functional economy, but whether GDP is growing will be of much less interest.

The new challenges of rapid environmental change can only be met by looking forward into the reality that is likely coming and addressing it on moral considerations. The economics profession has relied on analyses of the past and current economy to derive policy recommendations to guide the economy going forward. “The economy tells us so stories” were never justified in economic theory. With rapid change, looking back at an economy that has whizzed past will be harder to justify as a basis for saying what should be. Policy analysts will have to look ahead, weigh real-world driving forces, and morally respond to them. Policy debates will be about reality and morality, not whether GDP is rising fast enough to keep capitalists happy.

With more rapid global change, the multiple environmental sciences currently working at different locales and issues with their own regional scales will need to connect to global environmental dynamics to determine how to work with potential events and implement action. This is occurring in climate science and adaptation now. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services is another working experiment in dynamic, polycentric science and preparation. Dynamic polycentricity has been evident in how societies are learning about and responding to the Covid-19 pandemic too. Globally, societies will need to learn from, improve on, expand, and democratize the use of dynamic polycentric science to inform societal preparation. Significantly more societal effort will have to go into forward-looking science, updating collective understanding, and preparing for new conditions. To this end, citizen science will likely also become a normal part of life.

There will be major problems. Even before the consequences of climate change fully hit, it was difficult to address global environmental problems (Koetz, Farrell, and Bridgewater, 2011). The whole point of legislation and of regulations within agencies is to document and solidify public understanding and enable collective action in the future. Past social structures impede new understanding and action in turbulent times. Old ways of understanding are embedded in legislation that will get in the way of acting effectively unless legislation is constantly updated and/or written in a manner that is broad enough to admit change. Yet the only purpose of legislation and regulations are to provide legal structure and moral guidance, to set bounds within which agencies, corporations, and individuals can make decisions. More

frequently changed or broadly worded legislation and agency regulations will also necessitate more public trust which will also be more difficult to secure during rapid change.

Just finding words for new phenomena and processes and adapting the meanings of existing words is a major social challenge today (Norgaard, 2016). Scientists and the public will need to become much more sophisticated, to be constructively inquisitive, about words. This would entail a significant transition in political discourse, news reporting, and the exchanges on social media.

In spite of all of these challenges, this is still my hopeful vision of humanity's survival and escape from the Econocene. There will be considerable human tragedy and biodiversity loss before humanity and the biosphere return to less rapidly changing times. It is easy to imagine old myths from modernity getting in the way of the new shared understandings we will need for collective effectiveness in times of change. I do not know whether humanity's muddling through the Covid-19 pandemic with little reliance on economism is evidence that there is a deeper system of common myths in the collective imagination still available to sustain life through continued change and surprise¹⁹ Reducing current economic drivers of environmental change will help in the present and relieve delayed drivers in the future.

I remain hopeful in the possibilities of transitioning to a patchwork quilt of polycentric, adaptive provisioning systems driven by a sense of community and ethic of care, individual joy in gratitude for life, and from local to global preparative socio-biospherical wisdom (Norgaard, 1994). I find hope in the ethos of "Buen Viver" and arguments for a new emphasis on culture (Schafer 2008). I am pleased with the rise of alternative feminist social thought and the new respect for indigenous knowledges. I find hope in the degrowth discourse (Kallis et al., 2020). I revel in the prospects for designing human futures around existing plural provisioning cultures that richly span morality and reality (Arturo Escobar, 2018; Kothari, Salleh and Escobar, 2019; and Speth and Courier, 2021). While we will need to better understand biospheric dynamics, we will probably succeed by individually accepting the joy of limits on our own lives (Kallis, 2019). These are simply my favorites among an expanding literature envisioning possible futures beyond economics. My hopes for surviving the considerable challenges of rapid change through the next few centuries and escaping the Econocene leave economics as the dominant belief system in the past.

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¹⁹ I am not implying that the human cooperation we have observed is in any way morally respectable. I am simply inverse reasoning from the fact that human interactions have not totally broken out in war indicates that at least a barely sufficient level of cooperation is at work.

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