

Article

Beyond the Image of COVID-19 as Nature's Revenge: Understanding Globalized Capitalism through an Epidemiology of Money

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Abstract: Public discussion of the implications of the COVID-19 pandemic has reproduced several recurrent and interrelated topics in discourses on sustainability and the Anthropocene. First, there is an ambiguous concern—sometimes ominous, sometimes hopeful—that the pandemic will precipitate radical social transformation or even collapse. Second, there is widespread reflection over the risks of economic globalization, which increases vulnerability and undermines local food security. Third, the pandemic is frequently imagined as nature's revenge on humankind. This metaphor reflects a fundamental conceptual dualism separating nature and society that continues to constrain our efforts to understand the challenges of sustainability. To help transcend the epistemological and ontological dichotomy of nature versus society, the article proposes an epidemiological approach to all-purpose money. Conventional money is an artifact with far-reaching repercussions for global society as well as the biosphere. To approach it as the source of behavioral algorithms with severely detrimental consequences for both social and ecological systems might provide a middle ground for natural and social science.



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1. Introduction

Few global events have precipitated such a flurry of reflection as the COVID-19 pandemic. Hardly anyone on the planet has entirely escaped its manifold repercussions. Almost everyone has adopted some understanding of the COVID-19 phenomenon, assessed how politicians have handled it, and adjusted their lives accordingly. While merely the tip of the iceberg, public information and debate on the pandemic have dominated the media and generated new discourses among researchers and social movements. From day one, the year 2020 saw the pandemic unfolding in world society and in our collective human consciousness.

Precisely because the pandemic has so thoroughly permeated our world, it cannot be considered a specialty for epidemiologists or even medicine. Like the topic of sustainability, it raises countless questions about causes and consequences that implicate perspectives from a wide range of social and natural sciences as well as humanities like philosophy and history. Among the human sciences, there is hardly a discipline that cannot offer a specific approach to the pandemic. The virus is an inherently transdisciplinary object. The first thing that the COVID-19 pandemic should teach us, in other words, is that we can only understand it by combining perspectives from across disciplines. It is as impossible to contain within academic as within national borders.

The relationship between the pandemic and sustainability can be examined at several levels. In the most abstract sense, both phenomena require knowledge from both natural and social sciences. Research on the pandemic thus encounters methodological challenges and experiences that may prove useful to sustainability science, and vice versa. More

specifically, both the pandemic and problems of declining sustainability are largely consequences of globalization. In both cases, human health is jeopardized by the interaction of biological and ecological conditions on the one hand with social organization on the other. Both issues also evoke dread and anxiety about the destiny of global society.

This paper has two objectives. First, I identify some prominent themes in how the relationship between the COVID-19 pandemic and sustainability has been discussed in public debate over the past year. In particular, I examine several interventions addressing the following two issues: (1) What are the probable long-term consequences of the pandemic for sustainability and the global economy? (2) What are the implications of the pandemic for our assessment of the sustainability of globalization?

Second, I reflect on two meta-questions that are raised by these deliberations: (1) How do our frequently confused understandings of the pandemic, sustainability, and the Anthropocene illustrate our difficulties in integrating our concepts of nature and society? (2) Why have we for fifty years been so utterly incapable of curbing our carefully monitored march toward disaster? In other words, what is missing in our analysis of global society?

For reasons listed above, I do not attempt to draw a consistent boundary between my own concerns and those expressed in the discussions that I refer to. Nor do I find it useful in this new and unsettling context to draw a line between scholarly contributions on the one hand and contributions from scholars on the other. Consequently, in view of the profound transdisciplinarity of both challenges—those of the pandemic and those of sustainability—I am offering a critical argument on conceptual issues raised by their convergence rather than an exercise tailor-made to fit the strict criteria of natural science. I am aware that the form of this article does not conform with those strictures, but then neither pandemics nor sustainability issues are simply “natural” phenomena. To grasp their complexity, we obviously need to admit approaches and concepts from social science. In social sciences, for instance, discourses and public images are highly significant objects of study.

The first two questions referred to above were topics of intense deliberation as the potential impact of the pandemic was first being fathomed during the spring of 2020. While in voluntary isolation on my farm in southeastern Sweden, I followed the output of articles published by the electronic daily Resilience, which presents itself as a program of the Post Carbon Institute, “a nonprofit organization dedicated to helping the world transition away from fossil fuels and build sustainable, resilient communities.” The perspectives presented in these articles generally combined transdisciplinary competence, accessible prose, and central relevance to the interface of COVID-19 and sustainability. In the discussion that follows, I shall thus refer to a number of these articles to illustrate recurrent topics within the ongoing public discourse on how the pandemic relates to sustainability.

While the facts of the ongoing pandemic are reasonably clear, discussions regarding its future repercussions are inevitably steeped in uncertainty. Exploring the various visions of a post-pandemic world as imagined by thinkers deeply engaged in struggles for sustainability highlights the precariousness of the current global predicament. Their discussions frequently suggest hopes that the pandemic will lead to a radical reorganization of global society. It is as if decades of climate change anxiety have predisposed them to perceive this historical moment as precipitating a decisive shift toward a more sustainable world. Such apprehensions are evident, for instance, in Murphy’s [1] reiteration of the impending climate cataclysm so stirringly detailed by Wallace-Wells [2], and Moses’ [3] apocalyptic review of warnings from several climate scientists.

This existential perspective may in part explain why current political responses to COVID-19 have been considerably more radical—and more easily accepted by the public—than in previous pandemics. Are the affluent middle classes of the world perhaps now also more prepared to accept radical changes in their lifestyle—such as implied by policies for *degrowth* [4,5]—than they were fifty years ago? In deliberating on what the future will be, we need to consider both objective processes and human perceptions of them, as well as the interaction between the two. This is the transdisciplinary challenge of human ecology.

2. Themes

2.1. Long-Term Consequences: The Pandemic, the Planet, and the Prospect of Collapse

On 27 March 2020, an anonymous poet posted a succinct interpretation of the message delivered by the new virus: “I’ve come to shut down the machine whose emergency brake you couldn’t find” [6]. It has been estimated that the pandemic caused greater reductions in global greenhouse gas (GHG) emissions than any previous drop in anthropogenic emissions in human history [7] (p. 5). These reductions were mainly due to “a fall in fossil fuel consumption as airplanes are grounded, transportation reduced, trade hindered, and factories closed down” [7] (p. 8). No national or international efforts in the history of intergovernmental climate policy have had such a dramatic effect. Having long been troubled by the inability of politicians to curb GHG emissions, many commentators expressed surprise at what Bruno Latour called the “astounding” lesson “that it is possible, in a few weeks, to put an economic system on hold everywhere in the world” [8].

Initially, in other words, there was some optimism about the pandemic as a boost for sustainability. However, the pandemic-caused drop in global GHG emissions in 2020 (around 4.5%) was not even high enough to comply with what would be needed each year until 2050 to limit global warming to 1.5 °C. In its annual emissions report, the United Nations Environment Programme called the impact of the lockdown “negligible”, leaving the world “on course for more than 3.2 °C of warming by the end of this century” [9]. Furthermore, the impact on the growth of GHG emissions may be quickly erased when there is a return to business as usual. In fact, considering how little of the massive global stimulus spending has been directed toward “green” technologies, the pandemic may even delay the transition away from fossil energy.

It was obvious, however, that COVID-19 was not good for business as usual. The strategies used to control the pandemic have been diametrically opposite to the policies endorsed by economists to maintain “the strengths of the global economy, built around connectivity and inter-dependence” [7] (p. 8). Several analysts have warned that the global economy is heading towards a recession much worse than the financial crisis of 2008, potentially leading to tipping points triggering “food systems failure and large-scale urban abandonment” [7] (pp. 8–9). Such scenarios recall the collapses of past civilizations studied by archaeologists and historians, which often appear to have involved the confluence of several disruptive factors such as pandemics, climate change, and the disintegration of hyper-coherent economic networks [10–15]. As Klare [16] reminds us, “in the past, disasters of this magnitude have toppled empires, triggered mass rebellions, and caused widespread famine and starvation”. The alarm expressed regarding the coming “Coronavirus credit crunch” has frequently been apocalyptic [17]. Rees [18] concludes that the pandemic “will certainly induce a recession and possibly a global depression, likely reducing gross world product by a quarter.” Heinberg [19] suggests that we had a foretaste of “the end of growth” in 2008 but that “the current crisis promises to be much worse.” Cobb [20] notes that national governments are “going deeper and deeper into debt” and predicts that “global society is not going to return to its state prior to the pandemic.” Indeed, many commentators express hopes that post-pandemic policies will *not* be geared towards “going back to normal” or “returning to business as usual” [21,22]. Some thus view the historical discontinuity represented by the pandemic more as an opportunity for improving the world than as a sinister omen of apocalypse.

Pandemics have been contributing factors in several historical cases of collapse and dramatic societal change. A recurrent pattern in such examples of collapse is the convergence of several kinds of problems that combine to overwhelm a society. As Langley [14] writes,

[T]oday, we are in a position where the virus can be managed by most states, but we have yet to see how it combines with conflict, climate change, high levels of public and private debt and the epidemic of obesity and diabetes. The crash of 2008 may well have been a precursor to a more general economic disaster. We simply do not know. What we can do is study and learn from history.

Although readers of Resilience may have the impression that the likelihood of collapse is frequently invoked in public discourse, Smaje [23] argues that people and media in general are prone to dismiss such scenarios, whereas the topic urgently needs to be discussed.

2.2. Is Globalization Sustainable?

One factor that very obviously was conducive to the pandemic is globalization. No one has denied that the extreme connectedness of world society was its foremost condition. This is not to say that mainstream commentators have been prepared to question free global trade, only that even proponents of globalization are unable to deny its role in producing pandemics. This connection is evident from the long history of pandemics from the final centuries of the Roman Empire and the epidemiological catastrophes of medieval Europe and the post-Columbian Americas to the global spread of infectious diseases in recent centuries [24,25]. Pandemics are *socio-natural* phenomena that highlight a contradiction between the biological and societal conditions of modern human existence. Our organisms have evolved as participants in local ecological contexts, but as modern humans we are also socially connected to a global web of several billion others. Everyone thus risks becoming a victim of infectious disease appearing anywhere on the planet.

In addition to the risk for pandemics, globalization has long been criticized for aggravating global inequalities as well as ecological degradation. It is thus not surprising that the recent critique of its epidemiological aspects has converged with older critiques focusing on injustices and environmental destruction [26]. Proponents of more localized economies tend to view the pandemic as one more reason to challenge globalization. Rees [18], for instance, writes that “people everywhere are becoming conscious of hazards associated with today’s increasingly unsustainable entanglement of nations” and hopes that “community self-reliance, resilience and stability are once again valued more than interdependence, efficiency and growth.” Heinberg [19] similarly writes, “The lengthening of supply chains is the essence of globalization; if this has made us more vulnerable to crisis, then it stands to reason that we should re-localize some of our economic activity.”

Many commentators view the pandemic as a deathblow for neoliberal policies and for what Gilding [27] and Feffer [28] refer to as “market fundamentalism.” Feffer [28] illustrates the failure of “the invisible hand” to achieve market equilibrium by observing that the world in 2018 had 820 million malnourished people while 672 million were obese. He hopes that the COVID-19 pandemic will contribute to the dissolution of “free market” capitalism much as the Black Death in fourteenth-century Europe contributed to the erosion of feudalism. Again, to several contributors, the pandemic initially raised hopes for a more equal and sustainable world.

Several of the authors whose papers at Resilience address the implications of the pandemic emphasize the imperative of strengthening food security. The looming horror of a global famine has been exacerbated by the threats of climate change [29] and underscored by how the pandemic has exposed the hyper-coherence and brittleness of our globalized transport system. Holden [30] deplores the recent dismantling of the British infrastructure for local food supply that was deliberately reinforced during the Second World War. He writes that this infrastructure was a perfectly “resilient food system, but during the last five decades nearly all of this has disappeared” in favor of centralization, rationalization, and efficiency. Stoddart [31] observes that the pandemic has brought “a sheer frenzy of interest in fruit and vegetable growing as people seek to turn over their back gardens, patios, windowsills (and indeed any available space) to home food production.” She suggests that the “move into growing your own food is a hugely positive step on a multitude of levels ... and ... offers the potential for a more sustainable food system and society post-pandemic.” Inspired by visionaries like Peter Kropotkin, William Morris, and Ebenezer Howard, Draper [32] envisages humanity living in “self-organised communities supported by small-scale industry and more localised food production.” Smaje [33] similarly proposes “semi-autonomous, small-scale forest gardening combining a judicious mix of perennial and annual plants, including grains in sparsely distributed garden-sized patches.” While

acknowledging that self-sufficiency has some shortcomings such as yielding too little tax money for hospitals, Rundgren [34] also advocates “increasing the level of self-sufficiency in food and other essentials.”

The many voices calling for food security and a more localized social metabolism are difficult to reconcile with the worldwide tendencies toward greater urbanization and more globalized supply chains. The contradictory relationship between urbanization and sustainability was highlighted by several studies in the 1990s [35,36]. Rees [35] convincingly demonstrated that the notion of a “sustainable city” is an oxymoron, yet a quarter of a century later cities around the world are replete with proponents of high-tech visions of “urban agriculture” [37]. Images of hydroponic, LED-lighted urban farms may alleviate some of the existential dissonance experienced by many city-dwellers committed to sustainability, but the idea of cities feeding themselves remains absurd. The notion is an extreme version of the ecomodernist creed that urbanization and technological intensification will leave more of nature untouched [38]. It seems to be built on the misconception that material artifacts can be excised from the global socio-metabolic flows that sustain them, and that urban centers can be detached from their vast ecological footprints outside the city limits. Such fetishized understandings of technologies and cities are illusions produced by drawing their system boundaries too narrowly around tangible entities, ignoring that they are manifestations of less tangible fields of exchange relations [39]. They are conducive to a variety of illusory technological solutions to climate change and other sustainability issues [40,41], which simply displace problems to less affluent parts of the world-system, such as cobalt mines in West Africa or sugarcane fields in Brazil, or confuse us into believing in fantasies like “carbon offsets” [42].

The long-term global repercussions of the COVID-19 pandemic are impossible to predict, but we should not underestimate the political role of widespread shifts in human attitudes and sentiments. We are accustomed to thinking about a nation’s economy as a matter of objective circumstances, but the economic conditions of the post-pandemic world will largely be shaped by human perceptions. The pandemic may have transformed prevalent outlooks in unforeseeable ways, leading to behavioral changes that decisively influence the trajectory of world society. It is of course conceivable, as some prognoses suggest, that most people will simply want to resume their regular consumption habits as soon as possible, and with a vengeance [43]. As we have seen, however, many people suggest that there cannot, should not, and hopefully will not be a simple return to what we used to think of as normal. As Austin [26] proposes, the “coronavirus provides us with the unique and necessary opportunity to reimagine and restructure our relationship with the environment.” Citing the UN Secretary General, Lenzen et al. [7] (p. 9) conclude their article with the observation that we either “return to a business-as-usual path with more unnecessary crises, or [develop] a different economy that is compatible with more sustainable and resilient human societies.”

3. Meta-Questions

3.1. *The Nature/Society Binary: Zoonotic Pandemics, Sustainability, and the Anthropocene*

The COVID-19 virus is believed to have derived from wild animals (bats and pangolins) in Wuhan, China in late 2019 and by February 2020 had spread through much of Europe. Many commentators account for the increasing frequency of such zoonotic pandemics by referring to intensified human pressure on natural ecosystems, bringing humans into closer physical contact with wild species. Typical of this interpretation is Cobb’s [20] assessment that “humans are now routinely pushing into habitats where all sorts of viruses lurk.” Rees [18] states that the pandemic is “an inevitable consequence of human populations everywhere expanding into the habitats of other species with which we have had little previous contact” and that it “results from sometimes desperately impoverished people eating bushmeat, the flesh of wild species carrying potentially dangerous pathogens.” A wildlife adviser at the WWF asserted that “habitat loss, intensive agriculture and the over-exploitation of wildlife are key drivers of the emergence of novel infectious

diseases like Covid”, and the Secretary General of the United Nations suggested that the pandemic should be viewed as nature’s revenge against humanity [8]. Klare [16] similarly warns that “Mother Nature ... is striking back” and that “we now live on what might be thought of as an avenging planet.” Austin [26] suggests that zoonotic diseases tend to increase as a result of environmental degradation in the Global South resulting from the extraction and unequal trade of resources destined for consumption in the Global North.

While Austin’s point about degradation resulting from ecologically unequal exchange is very valid, it is doubtful whether degradation through modern extractivism puts humans in closer contact with wild animals than in traditional hunter-gatherer societies. The implication of this narrative is that the proliferation of pandemics should be understood as a consequence of the human propensity to transgress a boundary between society and nature that they should respect. However, hunter-gatherers in history and today have maintained much closer physical contact with wild animals than modern people. For instance, according to historical accounts, the indigenous peoples of northeastern North America were well acquainted with zoonotic diseases contracted from game animals [44] (pp. 143–144). Zoonotic epidemics deriving from the handling of killed primates and other tropical bushmeat in Central Africa [45] have gained worldwide attention not because eating primates is a recent practice but because there is now a much higher risk that such diseases will spread beyond the local context. Similarly, the traditional Chinese taste for bushmeat is not the primary cause of the COVID-19 pandemic. In accounting for such pandemics, the main problem is not the human invasion of nature—as if humans have not always been part of it—but the interconnectedness of our globalized economy. As McNeill [46] (p. 636) relates, the virus “apparently moved within days from Wuhan to every major Chinese city and within a month or two to more than 180 countries around the world.” The claim that there is now an increasing frequency of “zoonotic spillovers” is both unlikely and impossible to substantiate, given that we have no way of identifying their frequency among Paleolithic hunter-gatherers. The frequency of zoonotic epi- or pandemics is another matter, as such phenomena are results of social organization rather than merely human–animal interaction. The discourse on zoonotic spillovers attributes an almost purposive agency to viruses “lurking” in game, ready to pounce on the humans encroaching on their territory. It is misleading to attribute the threat of zoonotic pandemics to the violation of nature, rather than to the organization of modern society. The tendency to do so at first sight seems a sympathetic concern for wild biodiversity but on closer scrutiny reflects the peculiar modern notion that nature is a domain that humans should leave alone. It is thus symptomatic of modernity that globalization is taken for granted while Chinese markets for bushmeat are banned. It would be more incisive to question the way world society is organized rather than human propinquity to wild nature.

It is significant that a similar conceptual boundary tends to separate nature from society in mainstream discourse on sustainability. Our concerns with respecting planetary boundaries [47] are phrased entirely in terms of biophysical parameters that define the viability of the natural Earth system, while the societal peculiarities of globalized capitalism that propel us to transgress those boundaries frequently appear to be taken for granted. However, it seems skewed to focus on the biophysical limits of the global economy without addressing the necessity of recognizing societal limits to economic processes. As I have argued at length elsewhere [48], this means recognizing limits to what money can be converted into. Without a reflexive distance to the phenomenon of what Polanyi [49] called “all-purpose money”, an alternative to business as usual becomes literally unthinkable. Over the past few centuries, the logic of this peculiar meme has encompassed increasingly extensive surfaces of the globe. The capacity of all-purpose money to invade all human societies is an epidemiological phenomenon comparable to a global pandemic: this artifact of human imagination is a virus afflicting the entire biosphere. It has generated the algorithm of generalized commensurability, according to which the products of high-wage labor in the Global North are continuously exchanged for the products of low-wage labor

(and lax environmental legislation) in the Global South. It is ironic that globalization—the very foundation of the COVID-19 pandemic—is itself an epidemiological phenomenon.

Given that all market actors—individuals, corporations, and nations—will be pursuing the best bargains, the simple logic of all-purpose money inexorably generates increasing global inequalities and environmental degradation. As Heinberg [19] observes, we have increased global economic “efficiency” by taking advantage of “the cheapest labor and raw materials anywhere they exist.” In sanctifying the freedom of money and trade, the ideology of neoliberalism inevitably promotes these unsustainable processes. The tendency toward ecologically unequal exchange has been empirically confirmed at the global level [50,51]. The asymmetric transfers of biophysical resources, such as embodied labor, land, materials, and energy, from the Global South to the Global North are incontrovertible. Again, however, the social organization of neoliberal capitalism, reproduced by neoclassical economic theory, for which these transfers are invisible, has been as unshakable as the design of the money artifact of which it is the aggregate result. Although propelled by an idealistic worldview that remains blind to its material effects, the problem is framed in terms of a disturbed Earth system rather than in terms of a destructive world-system. The material metabolism of world society is not acknowledged in economic theory—as if physical reality belongs to an extra-social realm never impinged upon by societal exchange.

Our way of insulating nature from society is particularly well illustrated by the concept of the Anthropocene. The focus of this discourse is on how the physical imprints of human activity can be detected in geological sediments to an extent that defines a new period in the history of human-environmental relations. The reality of the new relation between humans and their global environment is established by several natural sciences documenting the various anthropogenic imprints that are methodologically accessible to them, while social-science accounts of the genesis and character of this relation are frequently ignored [52]. While research focuses on whatever can be physically measured, the economic relations that may organize and transform the material world appear to be too intangible to count as objects of scientific knowledge. Such a bias explains why the story of the COVID-19 pandemic tends to focus on bats, pangolins, and Chinese food habits rather than on the organization of the world economy.

Another connection between COVID-19 and the Anthropocene is the common trope of nature’s revenge. The Anthropocene narrative often assumes the form of an epic tragedy in which the technological hubris of a Promethean Anthropolos has destabilized and provoked a now avenging Earth [53]. This widespread and persuasive narrative risks reproducing two common flaws in how we understand the forces of the Anthropocene: convictions that human hubris is somehow biologically intrinsic to our species on the one hand and that ecological crisis is planet Earth’s deliberate revenge on humanity on the other. On the contrary, the propensity to devastate the biosphere is not an innate feature of our species, nor can the planet have purposes. The first claim is to naturalize capitalism; the second, to anthropomorphize nature. Clearly, framing the COVID-19 pandemic in terms of an avenging nature replicates a recurrent trope from the Anthropocene narrative. The underlying image in all these discourses on the pandemic, sustainability, and the Anthropocene represents humanity and human society as irrevocably alienated from nature and due for severe punishment.

3.2. Fifty Years after the Stockholm Conference: What is Missing in our Analysis?

It is now almost fifty years since the United Nations convened its first global conference on the environment in 1972. For many of us who can recall the optimism surrounding that event, it is ironic to assess the steady deterioration of the global environment since then—all while, for several decades, environmental concerns have been dominated by the rhetoric on “sustainable development.” I remember in the 1960’s writing to Bernhard Grzimek, author of *Rhinos Belong to Everybody* [54], anxiously asking him about the destiny of African wildlife. Since then, the population sizes of vertebrate species have declined by an average of 68% [55]. Of the total living biomass of terrestrial vertebrates

today, 59% are livestock; 36% humans; and less than 5% wild mammals, birds, reptiles, and amphibians [56]. There is now a consensus that we are occasioning a sixth mass extinction. Yet dwindling biodiversity is but one of nine “planetary boundaries” that are in the process of being transgressed as a result of global economic activity [48]. Climate change is another. The latest in a series of severe warnings about global collapse [57] identifies the major ecological symptoms—biodiversity loss, overshoot, and climate disruption—but in my view does not adequately represent the societal drivers that are the root of the crises. I am once again reminded that the researchers who tend to be most concerned about the viability of the biosphere as an objective reality—the natural scientists—are least likely to have the analytical tools to understand why it is threatened (while the social scientists, who might have such tools, regrettably tend not to be as concerned with biophysical realities). In studying non-human nature, natural scientists have no need for the kinds of concepts—symbols, money, political economy, culture, and discourse—that are essential in order to grasp the human phenomenon. The seventeen authors are confident that we know what to do but not how to do it [57] (p. 6). They observe that we need to change “the rules of the game”, but have they—or we—really understood the logic of that game? The fact that fifty years of global concerns about environment, development, and sustainability have only brought us closer to collapse suggest that we have not.

The natural scientists and the social scientists are like the blind men exploring the elephant: neither of them can grasp the whole. It is as misleading to approach human activity in the biosphere as comparable to that of other species as it is to think of the world economy as detachable from nature. In the context of the pandemic, it is revealing to compare the title of the historian William McNeill’s classic book *Plagues and Peoples* [24] with Rees’ [58] recent suggestion that people have become a plague species. Rees’ indictment of neoclassical economics—and frustration over its imperviousness to alternative perspectives—is entirely justified:

In the half-century since the theoretical foundations of ecological economics were laid down, and after more than three decades of sustainable development rhetoric, expansionist neoliberal thinking has colonized virtually the entire world. Ecological economics has had little discernible effect.

Rees’ indignation over the inertia of global ecological degradation leads him to agree with those who argue that our best hope of avoiding collapse may be an ecological disaster striking developed countries, terrible enough to make us understand that we must change our behavior. His article is a valid critique of mainstream economics, but it will not suffice to offer, as he does, an alternative narrative largely couched in terms of evolutionary ecology, referring to “humanity’s natural expansionist tendencies” [58].

Our pervasive global anxiety about what human society is doing to the biosphere is being expressed in innumerable different ways. There is a cacophony of voices, a confusion of tongues, yet most of us remain convinced that our own account is the correct one. The picture that comes to mind is a vast crowd of people thronging around multiple speakers, each proclaiming his/her own perspective. Each person in the crowd can only hear one voice at a time, yet each speaker believes that he/she is talking to the whole crowd. Such a detached view of our fragmented arena of discourse is humbling, and it helps to explain why we are making so little progress in grasping the predicament of the Anthropocene.

Why have neither natural nor social scientists been able to diagnose and propose effective remedies for fifty years of escalating ecological disaster? How might we find common ground for natural and social science? How can innate features of our species be made accountable for the forms of social organization that are devastating the biosphere? How can we find a way of integrating, as Chakrabarty [59] suggested, the history of our species with the history of capital? This is indeed the challenge of the Anthropocene.

As I have already suggested, the artifact of all-purpose money is the elephant in the room. It is a product of the unique human capacity for symbolism, an innate feature of our species, and simultaneously the very foundation of capitalism. It is the pivot on which the history of our species and the history of capital converge. It is the source

of globalization, ecologically unequal exchange, and global ecological degradation. Yet, neither economists nor ecologists spend much time contemplating what money really is. Neither social nor natural scientists acknowledge the pivotal role that cultural artifacts may have in generating social-ecological organization. Latour's early work [60,61] offered the germ of such a theoretical revision, but his subsequently confused and anthropomorphic argument that artifacts have "agency" [62] has some serious problems [63].

Being neither social nor natural, artifacts tend to be categorized as outside the domains of both social and natural science. Yet, no natural scientist could fully account for the processes of the Anthropocene without referring to the semiotic phenomenon of money that propels them, and no social scientist could do so without acknowledging that the money sign has very conspicuous material implications. Like viruses, artifacts are non-living pieces of information that may rewire living systems. They do not have purposive agency but generate algorithms and selective processes that reorganize societies and ecosystems alike. They thus provide common ground for social and natural scientists.

Discovering the elephant in the room might make economists finally realize what the money meme is doing to the biosphere while providing ecologists with a new perspective on the human economy. Like the COVID-19 virus, all-purpose money has suffused human societies around the globe. If the pandemic has made us more aware of the algorithmic logic of epidemiological phenomena, it might make us reflect over the radical causal power of a cultural meme, which, like a virus, can spread throughout a living system and destroy it from within.

4. Conclusions

Toward Social-Ecological Theory for the Anthropocene

In examining the intense deliberation on the implications of the COVID-19 pandemic that dominated a public forum for radical sustainability discourse throughout 2020, I note that there was a widespread inclination among the contributors to view the pandemic as nature's punishment for human provocation. Many considered fundamental social transformation or even collapse a possible outcome, and some explicitly hoped for such scenarios. A recurrent concern was the vulnerability resulting from economic globalization and the imperative of improving local food security. Much of the criticism of globalization drew on a long-standing critique of neoliberal capitalism as the driver of climate change and other transgressions of planetary boundaries.

At another analytical level, I conclude that discourse on the pandemic shares with those on sustainability and on the Anthropocene the difficulty of handling the conventional nature/society binary that tends to preclude holistic approaches to the interfusion of social and ecological phenomena. Several contributors argue that the pandemic is a result of humans penetrating a natural domain that should be left alone. This radical separation of nature and society replicates recurrent problems in conceptualizing the role of human economies in reorganizing the biophysical operation of ecological systems, including the Earth system as a whole. It is reflected in the limited extent to which natural scientists are equipped to analyze social and economic processes on the one hand and to which social scientists are equipped to analyze biophysical processes on the other. To transcend this impasse of nature/society dualism and encourage more integrated, transdisciplinary perspectives, I propose an epidemiological approach to human artifacts such as money, acknowledging the transformative and potentially disastrous social-ecological algorithms that they generate.

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