

**Failed Species: The Rise and Fall of the Human Empire**  
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*Once a remarkably adaptive and highly successful species, Homo sapiens has become the victim of its own success, succumbing to its own “progress trap” that leads it to think the solution to its problems are more development and further growth. Humans – too many of them – have failed to learn from the mistakes of the past that brought down every moribund society and bloated empire.*

*“I’d like to share with you a revelation I’ve had, during my time here. It came to me when I tried to classify your species and I realized that you aren’t actually mammals. Every mammal on this planet instinctively develops a natural equilibrium with its surrounding environment, but you humans do not. You move to an area and you multiply, and multiply until every natural resource is consumed. The only way you can survive is to spread to another area. There is another organism on this planet that follows the same pattern. Do you know what it is? A virus. Human beings are a disease, a cancer of this planet. You are a plague.”*  
- “Agent Smith,” *The Matrix* (1999)<sup>1</sup>



Prologue

Throughout the last ten thousand years of history, human empires rose and fall, crumbling into pebbles and dust. Over the last two hundred thousand years, an even larger empire began its mighty and perilous ascent. From its home base in Africa, it established its presence everywhere throughout the globe, expanding endlessly in all directions, growing exponentially in numbers, colonizing land, other species, and entire peoples. Insatiable in its consumption of natural resources, addicted to growth, it left death, extinction, and destruction everywhere in its wake. This vast conglomerate was not the Persian, Greek, Roman, Mayan, Ottoman, English, or American empires, but the consequence and aggregate of *all* particular empires and unsustainable hierarchical societies, namely, the *human empire*.

Today we call this planetary monolith “global capitalism,” but humans became global animals tens of thousands of years before the onset of capitalism. Humans created hierarchical and growth-addicted societies some ten thousand years ago and their ecocidal proclivities stretch back millennia more into prehistory. And just like every political empire of the past, the human empire has possibly reached its zenith and begun its downward spiral toward collapse. This empire’s peak and slide into catastrophe marks a new epoch not only in human history, but also the history of the earth. Debates over whether advanced societies have entered into a new “postmodernity” (see Best and Kellner 1991) pale in significance to the scientifically-based proposition that human activity has created a new epoch in geological history -- the *age of the Anthropocene*. This epoch characterized by the dominance of human influence over earth’s systems and has led to, among other colossal events, a sixth mass extinction crisis and runaway climate change.<sup>2</sup>

Once a remarkably adaptive and highly successful species, *Homo sapiens* has become the victim of its own success, succumbing to its own “progress trap” that leads it to think the solution to its problems are more development and further growth.<sup>3</sup> Humans – too many of them – have failed to learn from the mistakes of the past that brought down every moribund society and bloated empire. Just as today in the twenty-first century we are witnessing societies like Syria (and perhaps even the US) collapse into chaos and warfare, becoming “failed states,” so too, on a planetary scale, we behold the catastrophic wreckage of a *failed species*. We are living witnesses to the fact that every pathological lie and form of madness that humans have thrived on is now being refuted by an awakened earth system fighting back against the human onslaught, with devastating consequences to its parasitical social orders.

Amidst this staggering collapse of an unsustainable, growth-oriented, increasingly global empire tens of thousands of years in the making, we have to truly question whether there is in fact intelligent life on planet earth, at least among the species – *Homo sapiens* -- that vaingloriously calls itself “wise” or “rational man.” The ideologies of anthropocentrism and speciesism (both forms of human supremacism) have been exposed as deluded, narcissistic, and self-destructive fallacies.<sup>4</sup> The heralded “Age of Enlightenment” of the 18<sup>th</sup> century that spawned scientific and technological advance, democracy, capitalism, and “progress” failed to manifest and instead succumbed to mass prejudice, ignorance, and violent energies. With every passing day the modernist myths of progress are exposed as fantasies refuted by the ecological and social debacles they helped to bring about.

Of all the stories that could be told of the evolution of life on earth, the one told here, albeit in suggestive and sketchy form, is about the rise – and immanent fall – of a species unable to exercise its singular technological and conceptual powers toward good ends. This is the story of how a weak and vulnerable species changed from being vulnerable prey to becoming top predator. It is imperative to understand how one animal species, among millions of others, broke free of various constraints of nature, embarked on a dizzying pace of evolutionary change, grew parasitically at the expense of all other species and ecosystems, and in very short time wielded its growing technological prowess to spawn death, destruction, chaos, and collapse on a planetary level. *Homo sapiens* has emerged as a prodigal offspring of nature at war with the fecund earth that gave birth to it. This is the story of the chance emergence and rapid ascendance of one species – *Homo sapiens* – over all other species and the earth as a whole. It is the tale of a biological experiment gone awry, of a dexterous primate that evolved advanced intelligence and abilities but ultimately deployed its creative powers as mighty destructive forces, bringing about mass extinction, ecocide, and ultimately embarking on a mad suicidal path.

### Planet of the Apes

“We admit that we are like apes, but we seldom realize that we are apes.” Richard Dawkins, *A Devil's Chaplain: Reflections on Hope, Lies, Science, and Love* (2004)

*“Men prefer to believe that they are degenerated angels, rather than elevated apes.” William Winwood Reade, The Martyrdom of Man (1874)*

*“We are here because one odd group of fishes had a peculiar fin anatomy that could transform into legs for terrestrial creatures; because the earth never froze entirely during an ice age; because a small and tenuous species, arising in Africa a quarter of a million years ago, has managed, so far, to survive by hook and by crook. We may yearn for a ‘higher answer’ – but none exists.” Stephan Jay Gould, Life Magazine (December 1988)*

One cannot but marvel at the contingency, as well as inexorable drive and resilience, of the evolution of life on earth. While many planets with life no doubt exist in the vast universe, earth remains the only known planet where complex life has evolved. Our own “rare earth,” in Peter Ward’s and Donald Brownlee’s terms (2003), is positioned just right in relation to the sun and other planets for life to have evolved, and from its turbulent oceans the simplest forms of life emerged 3-4 billion years ago. Just as earth may have been a dead planet of rocks and gases, too hot or cold for life to emerge, so humans would never have evolved had not a meteor struck the Gulf of Mexico 65 million years ago, wiping out the dinosaurs and two-thirds of all other species. This cosmic event at the end-Cretaceous period changed evolution on earth in an instant, allowing mammals to exploit the new ecological niches and become ascendent forms of life.

Our earliest mammalian ancestors were nocturnal rodent-like creatures that lived about 145 million years ago (Choi 2017). But 40 million years ago, in one of the most consequential changes on earth, primates began to evolve. According to one account, “Orangutans were the first to separate [from the primate line of evolution], between 12 and 16 million years ago; gorillas between 6.2 and 8.4 million years ago and finally humans and chimps went their different ways between 4.6 and 6.2 million years ago” (Whitehouse 2001). Far from being a discrete species distantly separated from apes, humans comprise a *fifth* ape species, including orangutans, gorillas, chimpanzees, and bonobos. The divergence of the earliest human ancestors from primates (an order including monkeys, apes, and lemurs, among others) occurred in response to dramatic environmental changes and the imperative to adapt. As Bernard Wood writes, “About eight million years ago, much of Africa was covered with thick forests interspersed with rivers and lakes, and most primates were tree dwellers. During the period from 8 to 5 MYA [million years ago] the earth experienced the beginning of a long-drying and cooling trend. The drying occurred because an increasing share of the earth’s moisture was locked up in ice sheets that began to extend further and further away from the north and south poles. Temperatures fell, even in Africa” (2005: 58). Consequently, northern regions of Africa became drier, while in eastern and southern parts of the continent forests shrank to create open woodlands and savannas.

In the midst of these dramatic environmental changes, some apes remained in the trees and became ancestors of gorillas; another ape species, however, dividing from the chimpanzee line, compelled to adapt, moved down from the trees into the savanna woodland, perhaps thriving on roots rather than fruits (Wrangham and Peterson 1996: 49ff). We evolved, then, from rainforest apes to woodland apes to ancient human ancestors. This primate line that moved gradually from tree life to ground life, discovering new food sources and the advantages of standing erect and freeing its hands, thereby *embarked on a world-altering path*. This resulted in the first *hominin* life form, the first obligate bipedal species, and became our earliest human ancestor.<sup>5</sup> These early hominins, which included species from the *Ardipithecus* and *Australopithecine* genera, were 3 feet tall, hairy ape-men, closer to chimpanzees than to subsequent *Homo* species, but with slightly larger brains. Sculpted and reshaped by natural selection, the overhaul of the primate included changes in the arrangement and size of foot bones, hips, knees, legs, and hands, resulting in opposable thumbs and greater manual dexterity in hands now freed to use and carry tools.

While it is now widely appreciated that other animals such as chimpanzees make and use tools, hominin tool use became increasingly intentional and sophisticated. In a symbiotic development, technology and brain size co-evolved, such that cultural selection – powered by the transmission of learning from generation to generation -- overtook natural selection as the main driver of evolutionary change. Three to four million years after the emergence of the first hominins, a new genera of hominins evolved, the *Homo* genera, which included a number of *human* species (all *Homo* species are considered “human”) and more direct ancestors to *Homo sapiens*. This new *Homo* genera included *Homo habilis*, *Homo ergaster*, *Homo rudolfensis*, *Homo heidelbergensis*, *Homo erectus*, and *Homo neanderthalensis*. All were tool-using hominins of advanced intelligence, and over millions of years hominin brain size, intelligence, and technological sophistication evolved. *Homo habilis* is commonly designated as the first *Homo* species, appearing about two and a half million years ago.

Two points bear emphasis. First, contrary to earlier scientific understandings and the popular imagination which identified big brains and intelligence as the “essence” or most salient trait of *Homo sapiens*, it is clear that bipedalism is the first shift of major consequence and the foundation for subsequent developments. As Robin McKie notes, “we are, first and foremost, a two-legged mammal. We may take the business of walking on two feet – bipedalism – for granted. Yet it defines us in a remarkable way. Only when we had become an upright species could we evolve into the kind of creatures we are today” (2000: 10).

Thus, whatever the reason(s) apes began to walk upright (there are numerous theories), bipedalism was the first crucial step toward human evolution. It freed the hands for carrying, tool-making, signaling, and other functions. Early hominins were by no means like us, but without becoming bipedal, they could not have become us. Large brains emerged as an effect of bipedalism, not as a cause of it, and technologies, complex cultures, language, and large, neo-cortex-bulging brains did not appear until over two million years after human ancestors first began to walk upright. Our distant ancestors had small brains, but these grew in response to survival challenges, the need for greater social cooperation, and improved tool-making techniques. Bipedalism and tool-making were the initial catalysts in a complex feedback loop of accelerating evolutionary change whereby early *Homo* species shifted from the slow change of natural selection to the fast lane of cultural selection.

Second, there was not only one, but a *plurality* of hominins and, later, *Homo* species, scattered throughout the African continent and, soon, around the globe. While stereotypes of Neanderthals as brutish, grunting cavemen still prevail, in fact they had relatively advanced technologies and cultures compared to earlier *Homo* species and, some argue, quite comparable to human levels. But, emerging less than two hundred thousand years ago, *Homo sapiens* were arguably unique among all *Homo* types in the greater sophistication of their technologies, cultures, art, and intelligence. Humans also had, likely due to fortuitous gene changes in the vocal tract and brain, a flexible voice box. With the growing sophistication of their technologies, cultures, language use, and intelligence, leading to a fully modern human brain, Jared Diamond argues that around 50,000 years ago, human evolution took a sudden “great leap forward” in culture and sophistication, such as evident in Cro-Magnon cave paintings in France (see Diamond 1992 and 2008).

Yet, too often, emphasis on the uniqueness of *Homo sapiens* obscures the fact that there were a *plurality* of human types that existed within the last two or three million years, scattered across the globe. As paleontologist Yoel Rak, states, “We have got to get rid of an idea, now deeply ingrained in our conscious, that because there is only one species of human being today, this has always been the case. For most of our evolution the opposite was true. There were at least two. Deeper in our history there may have been even more. Think of that scene from *Star Wars* – in the bar where you see all kinds of aliens playing and drinking and talking to each other. I believe that image gives us a better

flavour of our evolutionary past” (cited in Stringer and McKie 1996: 100). According to one estimate, 9 now-extinct human species walked the earth 300,000 years ago, in regions such as central Africa, Indonesia, Asia, Europe, and China. The Smithsonian National Museum of Natural History has listed 21 different human species commonly recognized by scientists, and this is not even an exhaustive count (Plackett 2021). A June 2021 study published in *Nature*, suggests that Denisovans, Neanderthals, and *Homo sapiens* may all have intermingled in a southern Siberia cave area about 45,000 years ago (Zavala, E.I. et. al. 2021).

With recent research and discoveries from a number of scientific disciplines, we have a much greater appreciation of the diversity of archaic and modern human species, the divergence of evolutionary timelines, and the multiple lines of *Homo* migration out of Africa. This grasp of plurality and complexity helps to shake us from the dogmatic slumbers of teleology, linear evolution, and anthropocentrism that privileges our own species in quite cosmic terms. “The march of progress,” says renown evolutionary theorist Stephan Jay Gould, “is the canonical representation of evolution – the one picture immediately grasped and viscerally understood by all” (cited in McKie 1999: 40). But it is wrong. We forget, as anthropologist Robert Foley put it, that “Evolution is about diversity. It’s not just lines leading to us.” (cited in McKie 1999: 35). In terms of hominin evolution, evolutionary lines branched out into numerous directions, as multiple experiments in hominin forms. We know that there was not one great migration of *Homo sapiens* out of Africa, but rather that numerous *Homo* species migrated into different regions and at different times.

In place of the linear metaphor and model – whereby change and time represent a straight and undeviating progression from simple to complex, from “lower” to “higher,” from less to more “perfect” – Gould deploys the concept of evolution as “a copiously branching bush continually pruned by the grim reaper of extinction, not a ladder of predictable progress” (1990: 35). For Alan Templeton, the human lineage is so complex that even the “bush” or “tree” metaphor itself is too simple and linear: “We humans don’t have a tree relationship, rather a trellis. We’re intertwined” (cited in Fitzpatrick 2006). To underscore this point, and expose the central fallacy of teleology (goal-directed change) from the standpoint of natural selection, Joan Dunayer writes: “The evolutionary bush on which humans occupy one of myriad branches is reduced to a single stalk, with nonhuman animals mired at its roots and humans blossoming at its tip. In reality, species do not evolve toward greater humanness but toward greater adaptiveness in their particular ecological niche. Nor is species something stable and fixed. The human species, like all others, continues to undergo variation. In capacities and tendencies humans vary across a vast range which overlaps with the ranges spanned by other species.” (cited in Deckha: 2006). There were possibly nine or more *Homo* species walking the earth 300,000 years ago (Longrich 2019), and scientists continue to discover new ancestors and human cousins. The 2004 discovery of *Ardipithecus kadabba*, the earliest hominid ancestor dating back six million years, and *Homo floresiensis*, a possible descendent of *Homo erectus*, are signs of further proliferation, division, and subdivision of hominin species.

A startling implication of the diversity in the *Homo* line of evolution is that other species – that is, other *natural experiments with the hominin form* – may have survived longer and may have interacted and interbred differently, yielding different species. Moreover, a species other than *Homo sapiens* – such as *Homo erectus* or *Homo neanderthalensis*, or perhaps a species that became more advanced --- may have prevailed on earth, leaving a much different culture, legacy, and environmental impact than the dominator cultures humans developed over the last ten thousand years. Thus, the transition to *Homo sapiens* – as a contingent process not a goal or destiny – developed in numerous directions, not only one, with each pathway evolving at varying rates according to differing environmental, biological, social, and technological conditions. There was no straight procession or linear trajectory from australopithecines to *Homo sapiens*, but rather radiations, proliferations, hybridizations, and rhizomatic lines of change that often spawned subspecies which themselves divided and multiplied until reaching

an evolutionary cul-de-sac -- the endgame of extinction. Collectively and often individually, hominid species formed variable clusters. Amidst a variegated African landscape and dynamically changing climate, there was a regional and individual variety of hominid types, and the complexity and diversity increased as other ancestral species crossed the Sahara and settled into the Mediterranean and European worlds. Any one of our evolutionary cousins might have evolved beyond 40,000 years ago, but only *Homo sapiens* prevailed. It would be the height of ignorance and arrogance to think that a plan, purpose, or goal informed this evolutionary outcome, or that something other than chance, luck, and -- to give credit where it is due -- skilled adaptations to challenging and changing environments. Still, as McKie emphasizes, “[g]ood fortune, not predestined greatness, has been the leitmotif of the story of *Homo sapiens*” (2000: 187).

*Homo sapiens* therefore emerged as a highly adaptive and successful species, including its shift to becoming more efficient hunters and adopting an omnivore diet, but it quickly embarked on paths of eccidal and suicidal destruction and hierarchical domination – paths informed by predatory values, malignant worldviews, and dysfunctional, unsustainable, and crisis-ridden lifeways. The numerous forms of human “success” are inseparable from the many failures of various societies to adapt to and harmonize with their environments and from a violent and domineering mentality that now threatens all life on earth. With rare exceptions, humans have never learned not to deplete natural resources, not to hunt unsustainably, and not to overshoot the limits of their environments and disrupt complex webs of life. As I will discuss below, the massive assaults humans unleashed on other species and the natural world early in their history led to the beginnings of *the sixth great extinction crisis* in the history of the planet, which is rapidly accelerating before our eyes. Moreover, the escalating disturbances to the natural world and the underlying pathologies that informed the evolutionary “success” of *Homo sapiens* are stunningly evident amidst the ecological and social crises afflicting the new age of the Anthropocene. While a new geological and human epoch has indeed arrived in dramatic form, its determining causes have a long history, with roots in the Late Pleistocene (the period between 130,000 and 12,000 years ago) and with the emergence of big-game hunting, which marked the first momentous shift in human history as humans made the transition from being prey to predator.

#### From Prey to Predator

*“[A] small window of time in our recent history points toward the adoption of true big-game hunting, yet millions of years of our early history indicates that we were mainly a prey species.” Donna Hart and Robert Sussman (2005)*

One of the most persistent myths of human nature and evolution is that of “Man the Hunter.” This myth essentializes early humans as carnivores, natural born killers, and mighty hunters from the start. All aspects of this myth have been proven false. Our hominid ancestors secured their meat primarily through scavenging, not hunting, and therefore were dependent upon the efforts of other species. Throughout most of their history, humans and their ancestors were vulnerable prey, not powerful predators; they were the hunted, not the hunters. Lacking size, strength, speed, and natural defensive mechanisms such as the teeth of a tiger, the claws of a bear, or the speed of a cheetah, human ancestors walked everywhere with fear and anxiety, constantly vulnerable to attack from formidable carnivores such as giant dagger-toothed dogs, flesh-tearing hyenas, massive bears, and saber-toothed cats.

Outnumbered, slower, and weaker than the ferocious beasts that hunted them, humans had to band together, cooperate, communicate with sounds, guard sleep sites, and on the whole be clever and smart. The need to survive attacks from killer carnivores forced our early ancestors to adapt and evolve their forms of communication, cooperation, and intelligence as a whole. “For 7-10 million years of hominid evolution,” Hart and Sussman write, “predators were a factor shaping evolution” (2005: 10) (also see Rincon 2006). Humans developed “behavioral, ecological, and morphological adaptations as an outgrowth of predation” (Hart and Sussman 2005: xvi). Thus, despite the “Man the Hunter” myth,

being *hunted* was a crucial and more lasting factor in early human evolution, and arguably played a more significant role in the development of wits and intelligence than, say, meat consumption, which is frequently credited as being the main stimulus to human brain growth (see, for instance, McKie 2000, Stanford 2001). For Hart and Sussman, “the hackneyed, but eternally popular, view of our ancestors as meat-eating, mega-beast hunting killers is a totally erroneous concept” (ibid.)

The status of hominids as hunted instead of hunters destroys the image of powerful hominids at the top of the food chain, and it also underscores a key dynamic in human evolution, involving a *coevolution* between humans (as prey) and powerful carnivorous animals (as predators). But what humans lacked in size and strength they began to compensate for with intelligence, cunning, and technology and, after millions of years, modern human ancestors began to turn the tables. With the development of tools and weapons such as spears powerful enough to bring down large and dangerous animals, along with new techniques of social cooperation, humans initiated one of the most consequential changes in evolutionary history – the shift from prey to predator, indeed to top predator on a global scale.

*The fate of earth changed decisively in this transition*, for humans quickly became not just hunters, but *exterminators and agents of mass extinction*, driving the megafauna of the planet into extinction. They also were becoming *world-shapers*, altering every environment they inhabited and disrupting ecosystems in significant ways (see below). It is not exactly clear when the shift from humans as prey to predator began (spear technologies were first used 400,000-500,000 years ago and continuously evolved) but evidence of sophisticated killing technologies dates back at least 90,000 years ago in Africa (see Pringle 2013), or perhaps as far back as 400,000 years ago with evidence of finely crafted spears made by *Homo Heidelbergensis* found in Schöningen, Germany (McKie 2000). By coordinating in a small group, surrounding large animals, and hurling a fusillade of deadly projectile weapons, humans had dramatically reversed the power relations among animals on earth. In addition to clubs, spears, and bows and arrows, humans developed snares, traps, and other killing technologies, and pioneered the technique of driving herds of animals off a cliff to their death.

Humans put their rapidly developing hunting process to good use, much too-good, and *their mass slaughter of other species represented their first major impact on the world* (see below) and arguably was the beginning of the sixth mass extinction crisis within which we currently live. As humans embarked on the path of becoming the first global species, they brought their violent proclivities, lethal technologies, and ecocidal systems with them to every corner of the earth.

#### Out of Africa, and Out of Control: Pleistocene Overkill and the Global Rampage

*“Whatever the reason, the ancient Africans reached a watershed. They were ready to leave, and they did. This great migration brought our species to a position of world dominance that it has never relinquished and signaled the extinction of whatever competitors remained ... When the migration was complete, Homo sapiens was the last—and only—man standing.”* Guy Gugliotta (2008)

For the first 5 or 6 million years of their history, *Homo* species remained confined to Africa, before beginning waves of migration to other continents. There is tremendous debate about where, when, and how various *Homo* species left Africa to colonize other parts of the globe. Yet with increasingly precise sciences and new discoveries, we learn ever more about human evolution, and the human origins narrative will continue to change, but important facts are well-established.

No one contests that all humans ancestors evolved in Africa around 5-7 million years ago and from there migrated throughout the world. According to anthropologist Brian Fagan, human migrations out of Africa began about 1.8 million years ago, as *Homo ergaster* left moved into Western Asian and then Europe. By 200,000 years ago, *Homo neanderthalensis* were established in Europe. 100,000 years



later, *Homo sapiens* groups – who evolved between two hundred thousand and one hundred thousand years ago -- settled in the Near East. About 55,000 years ago (perhaps much earlier), during the last Ice Age when much of the world's temperate zones were covered by glaciers, fully modern humans (known as anatomically modern humans, *Homo sapiens sapiens*, or Cro-Magnons) settled throughout Near East Asia, living alongside small and scattered Neanderthal populations, and about five thousand years later moved northward in Eurasia and Europe (again encountering Neanderthal groups). From there, *Homo sapiens* populations journeyed into Australia, New Zealand, Siberia, and, 20,000 years ago, into the Americas. Thus, within about 30,000 years, humans had rapidly established a growing empire in every pocket of the world, conquering every land mass, save Antarctica. As described by Nils Eldredge (1997), *Homo sapiens* became the first “global species,” as it radiated outward in all directions in all directions, untethered from any one local environment, eventually establishing sophisticated networks of communication, economics, and trade.

In the process of colonizing the globe, humans became incredibly diverse in “race,” ethnicity, language, and culture, yet, during the Late Pleistocene, the results of human expansion reveal the same disturbing pattern. Wherever humans went, Paul Watson argues, “their arrival was followed by large die-outs of megafauna. Primitive hominids were well-organized, efficient, slaughter crews. As they advanced, the mammoth, saber-toothed cats, cave bears, giant sloths, camels, horses, and wholly rhinos fell to their stone weapons and deliberately set fires. The extinction of all of these great mega-species is directly attributable to ‘primitive’ human hunters” (2007). Humans targeted the large land animals -- or “megafauna” – of the late Ice Age because they provided the most meat, skin, and usable body parts, and often were slow-moving, though always dangerous, targets. The fact that humans were a new and invasive species in their environments, armed with lethal weapons and killing strategies, and with whom animals had no experience, often made megafauna easy kill. Only those animals wary of humans and small and agile enough to evade their assault survived. Before humans entered into North America 20,000 years ago, the continent was as rich in megafauna diversity as Africa, including the presence of camels, but was soon radically reduced in diversity after human arrival.

An intense and still-raging debate about “Pleistocene Overkill” was launched by geoscientist and paleobiologist Paul Martin in the 1960s. Martin advanced the controversial thesis that humans brought about the extinction of all large animals in every new part of the world into which they migrated, whether by hunting them or outcompeting them for resources. Humans do not just hunt and kill animals in sustainable numbers, Martin argued, rather they engage in forms of “overkill” that wipe out entire species and genera of nonhuman animals. For Martin, there is a causal connection between the arrival of humans on pristine lands and the disappearance of megafauna. In North America, for instance, where he focused his research, some 37 genera of large-bodied mammals became extinct by the end of the Pleistocene, and Martin argues that they were all victims of human overkill. Martin’s “Pleistocene Overkill” theory claims that “virtually all extinctions of wild animals in the last 50,000 years are anthropogenic, that is, caused by humans” (Martin 2005: 3), and not by other factors, including environmental or climate change.

As Eldredge notes, “The evidence is straightforward: Wherever we went, other species seem to have become extinct shortly after our arrival. Whether it was Malagasy peoples reaching Madagascar a scant 2,000 years ago, or peoples arriving on Caribbean Islands at about the same time; or people living in the New World 12,000 years ago; or aboriginal Australians getting to *their* home 40,000 to 50,000 years ago, the results always seem to have been the same: Substantial numbers of species soon disappeared, especially but not exclusively prime hunting animals, such as large game animals and, in a few instances, large birds” (2009: 83-83). Similarly, Jared Diamond writes: “[o]n every one of the well-studied oceanic islands colonized in the prehistoric era, human colonization led to an extinction spasm” of geese, seals, moas, giant lemurs, and other species (2017: 42-43). As Wright bluntly puts it, “A bad smell of extinction follows *Homo sapiens* around the world” (2005: 37).



Immediately after Martin's initial provocation, numerous theorists – perhaps reluctant to confront the bloodlust and unbridled Id manifest in *Homo sapiens* from its early beginnings – challenged Martin's overkill model and sought other causes to explain the extinction of megafauna. According to this school, the extinction of the megafauna resulted from environmental, not human, causes, involving abrupt changes in climate and ecosystems to which numerous species were unable to adapt. Theorists in this camp question whether early human hunters were sufficiently numerous and technologically advanced to exterminate whole species. They emphasize that climate changes disrupt entire ecosystems, eliminating food sources, disrupting birth cycles, and exposing animals to conditions to which they were not adapted. Some theorists also hypothesize that many species were wiped out by diseases. Against the environmental causation argument, the anthropogenic model argues that animals have thrived in past times amidst equally dramatic changes in climate and environment, and that while climate change may have been a key factor in the demise of some species, it cannot explain the same pattern -- extinction coinciding with human arrival -- recurring over a period of 50,000 years. As archaeologist Todd Surovell notes, "The best way to falsify [the] overkill [thesis] is to show animals went extinct before human arrival. For 50 years now we've been trying to falsify overkill and we've failed. That, to me, suggests it's a pretty strong hypothesis" (cited in Boissoneault 2017).

This debate over the causes of Pleistocene extinction rages on without clear resolution, but no doubt it involved a combination of environmental and human factors.<sup>6</sup> We want to avoid a priori assumptions and reductive thinking on both sides of the issue, noting when environmental changes severely affected animals and when species fell at the hands of humans. The complexity of extinction clearly calls for a multicausal explanation, looking at both environmental and human causes of extinction. We need to make an important distinction here as well, between direct and indirect anthropogenic causation. Humans can directly cause extinction through hunting and overkill, but they can also have profound indirect effects on species by competing for food sources, degrading ecosystems, habitat destruction, and so on. These effects can put pressure on apex predators and ultimately ramify throughout the food chain and ecosystem. One computer simulation of the end-Pleistocene megafaunal extinction in North America, however, showed that "even low levels of human hunting would have driven the Ice Age behemoths out of existence. Importantly, the simulation, which assumes a slow human population growth rate and low maximum hunting efforts, correctly predicts the fate of 32 out of 41 megafaunal species. These findings ... show that in fact anthropogenic extinction was unavoidable" (Wong 2001).

This distinction between direct and indirect hunting or massacre of animals brings about a number of critical results. First, we need to shift the definition of humans from an atomized focus on being merely *hunters* to a more systemic focus on their role as *eco-system shapers*. For throughout their history humans did not just kill animals, they inhabited landscapes, consumed and depleted resources, degraded habitats, leaving not just death to other species of whole genera of animals but widespread environmental impacts. Of course (over)hunting animals and environmental exploitation are interconnected as the extermination of animals has systemic effects on biodiversity and whole living systems and environmental degradation can lead to the loss of countless species. We are clearly seeing these dual dynamics play out today, as humans continue to slaughter and exterminate species and ecological systems are breaking down everywhere. Second, the shift to framing humans as *ecosystem-shapers* rather than only as *hunters* can perhaps mitigate some of the misanthropic contempt one might have for humans throughout history, understanding that extinctions did not always arise from the tips of human spears and orgies of killing but rather one species, among others, exploiting an ecological niche for survival, perhaps unaware of species limits and finitude and the consequences of its actions. Overhunting eliminated "keystone species" such as the mammoths or mastodon, disrupting entire ecosystems as a result, and contributing to environmental collapse and a more general extinction.

This is no way, however, diminishes the incredible death and torture humans have inflicted on other animals (and one another) throughout history or the senseless ways they destroyed, and continue to destroy, natural environments. Nor can it take away from the fact that humans have brought about species extinctions and environmental destruction very early on in their existence. There is a persistent and influential myth that warfare, environmental destruction, and the slaughter of animals began with modern Europeans, or perhaps with the emergence of western civilization. As part of this utopian fantasy and cultural Manichaeism, scores of writers have portrayed Native Americans, non-western cultures, and pre-agricultural societies in Rousseauian terms of noble, peaceful peoples who never killed needlessly, without reverence, and or in disharmony with ecological balance and sustainability.<sup>7</sup> While certainly no cultures, peoples, and social systems have been as devastating to animals and the environment as modern capitalism, there was no Edenic time, no Golden Era, when humans lived in peace and harmony with one another, other species, and their natural surroundings. Problems like species extinction, resource depletion, desertification, and overall mindless destruction of life and ecosystems did not originate in European modernity but rather have deep roots in antiquity and prehistory.

There is thus continuity between what we see as vast historical periods, between “the huge waves of extinctions a few thousand years ago as First Peoples spread out into new continents and remote archipelagoes” and “the current wave of destruction loosed by modernity and its growing appetites” (Brannen 2017: 240). Humans not only exterminated other species, they depleted and degraded their natural environments, leaving behind permanent scars and damage present still today – such as evident in the desertification of the Mediterranean basin. The use of fire, for instance, the first evidence of which dates back perhaps to 400,000 years ago or perhaps even to 1,000,000 years ago (Cohen 2012), was one of the first significant technologies humans used not only for warmth and cooking, but also for clearing environments and hunting. According to Paul Watson (2007), 50,000 years ago, across Australia, the ancestors of modern day Aboriginals deployed fire on a widespread scale with devastating results that lead to the extinction of 85% of the megafauna on the continent and disruption of the entire ecosystem. As powerful a tool of disruption fire, spears, bows and arrows, and other technologies were in the hands of early hunters and world-shapers, humans took a quantum leap forward in their ability to manipulate and transform the natural world with the development of agriculture.

### A Tale of Two Humans

*“Neanderthal people were collateral cousins, perhaps already living in Europe while we emerged in Africa... In other words, we are an improbable and fragile entity, fortunately successful after precarious beginnings as a small population in Africa, not the predictable end result of a global tendency. We are a thing, an item of history, not an embodiment of general principles.” Stephan Jay Gould (1990)*

*“Thirty thousand years ago there lived 'another human species' - the Neanderthals .... [this] is symbolically more important than the fact that man is descended from the apes. The shadow of this vanished human species weighs heavy on all our anthropology, since our entire concept of evolution privileges the exclusive universality of a single humanity, ours, the one that survived. And what if it were not the only one? Then that's the end of our privilege. If we had to eliminate this twin, this prehistoric double, to ensure our hegemony, if this other species had to disappear, then the rules of the game of being human are no longer the same.” Jean Baudrillard*

It has become increasingly clear that since early in their history humans have been bent on species annihilation, ecocide, and ultimately suicide. The first weapons of war humans developed were turned on the world’s megafauna, but it was not long before humans deployed them against one another,

against societies, and entire peoples. Some theorists speculate that the first act of genocide occurred quickly after *Homo sapiens* moved into southern Europe, about 45,000 years ago, where Neanderthals had established themselves, among other regions, nearly two hundred thousand years earlier. It is indeed remarkable that upon after encountering *Homo sapiens* in Europe, Neanderthals went extinct 15,000 years later. Is this the same pattern repeating itself as with the extinction of megafauna, where *Homo sapiens* migrate to new environments and other species die off, or an example of a *post hoc ergo propter hoc* (“after this, therefore because of this”) causal fallacy?

As true of the Pleistocene overkill debate, what exactly happened in the encounter between modern humans and Neanderthals in southern Europe during the fifteen-thousand year period in which they co-habited is widely debated and far from resolved. And as with the overkill debate, the two main camps are defined by a contrasting focus on environmental and human causes. The first camp holds that Neanderthals died out because they failed to adapt to changing climate conditions, as well as to competitive pressures exerted by the presence of *Homo sapiens* – and their superior cognitive and technological skills -- in their territory. Long-adapted to the colder climates of Europe, however, it is *prima facie* implausible to believe that Neanderthals – who have been adapting to challenging and changing climates for 200,000 years -- suddenly died out due to sudden climate shifts. This makes many theorists conclude that *Homo sapiens*, not environmental conditions brought about the extinction of Neanderthals as they reached their end in remote areas of southern Spain 30,000 years ago. This camp has a cynical view of the violent tendencies of *Homo sapiens* and doubts that they peacefully interacted with Neanderthals. As Wade explains, “Given the hostility of human hunter-gatherer societies toward each other, and the extreme fear than Neanderthals seem likely to have evoked in modern humans, it is hard to imagine that the two species enjoyed hanging out with other, let alone that they would welcome an exchange of marriage partners” (2006: 91). In truth, however, *Homo sapiens* and Neanderthals interbred in the past, and we carry Neanderthal DNA in our genome as evidence of this fact, but as we know from human experience sex is not incompatible with conflict.

Diamond emphasizes a repetitive historical dynamic in which those with superior technologies invade, conquer, and slaughter peoples with less advanced technologies. It is of course quite possible that maladaptation, interbreeding, and climate all played a role in the demise of the Neanderthals, but implausible that human violence did not play a significant or the decisive role in ensuring the rise of the global humans. “If so,” Diamond concludes, then the Cro-Magnon-Neanderthal transition was a harbinger of what was to come” (1992: 52). As newcomers or invaders encountering indigenous European Neanderthals, this position argues, humans waged a genocidal war against Neanderthals and gained the decisive edge partly through slight technological advantages and ruthless cunning. Neanderthals resisted their aggression intensely, but steadily lost ground, and finally vanished from their refuge in the Iberian Peninsula. For Wright, the massacre of *Homo neanderthalensis* was the first act of human genocide and a prelude to the assault of agricultural societies against primal peoples for thousands of years – from Columbus’ slaughter of the Taino Indians, Pizarro’s extermination of the Kayapo peoples of South America, and the US pogrom against Native American nations to the Nazi annihilation of six million Jews and other peoples and the genocidal warfare in Rwanda and Darfur.

Theorists like Brain Fagan insist, to the contrary, that *Homo sapiens* and Neanderthal interaction was mostly limited to rare and curious encounters from afar, let alone involving hand-to-hand combat, and that the two human species had crossed paths inconsequentially earlier in the Near East before humans entered into Europe. Fagan also claims there is no evidence (such as spear points embedded in skeletons) to support the warfare theory. While no one is sure what ultimately caused the demise of the Neanderthals, Fagan argues that although Neanderthals were more advanced than their *Homo* predecessors, and hardly worthy of the brute caveman stereotype, *Homo sapiens* nonetheless were significantly more advanced and had decisive competitive advantages. Fagan emphasizes that humans had greater intelligence, sophisticated language, better hunting technologies (such as more lethal stone-

tipped spears that could be thrown from a greater distance), and key innovations such as threading needles to sew together more protective clothing, as opposed to draped skins. “In the long run,” Fagan writes, “two innovations, layered clothing and more effective projectiles, gave the Cro-Magnons [“modern humans”] a decisive practical advantage over the Neanderthals ... Cro-Magnon technological imagination opened up for them a whole new ecological niche that had been beyond the reach of their predecessors” (2010: 14). Combined with better cooperative skills, abilities to plan ahead, and nourish themselves with dance, song, art, and cultural rituals, these innovations gave them superior adaptive and coping skills in the face of environmental challenges. If there was a disastrous impact of *Homo sapiens* on Neanderthals, Fagan argues, it was unintentional and indirect. The mere fact that humans – ecosystem shapers – entered this new world in which Neanderthals were ensconced “eventually disrupted and destroyed a form of human [Neanderthal] existence that had remained virtually unchanged for more than two hundred thousand years, its ancestry even deeper in the remote past” (Ibid: 21).

Surely humans played some role, direct or indirect, violent or competitive, in the demise of the Neanderthals and whatever the ultimate causes, the fact remains that Neanderthals died out 30,000 years ago, 15,000 years after encountering *Homo sapiens* in Europe. And there, *Homo sapiens* stood on a major threshold of history, poised at the crossroads of monumental change. For with the end of Neanderthals 30,000 years ago, and the subsequent disappearance of a *Homo erectus* variant (*Homo floresiensis*) from the remote island of Flores 10,000 years later, 20,000 years ago *Homo sapiens* became *the sole heir of the stunning evolutionary journey and proliferation of bipedal animals that began 5-7 million years ago*. The diversification of the *Homo* genus was suddenly reduced to just one type, with all other twigs on that primate branch of evolution dispatched to the oblivion of extinction. “We feel special. Yet it is probably for only the past 30,000 years – a tiny fraction of our evolutionary history – that Earth has been home to only one species of hominid” -- *Homo sapiens* (McKie 2000:40-41). Of all the possible types of *Homo* species that might have evolved, co-existed, and prevailed, all but one exited the earth and the vast globe spread before it as something to possess, subjugate, and exploit.

The next great leap in the expansion of the human empire, in its globalized growth trajectory and its technological ability to exploit animals and the natural world for its own benefit, accompanied by their growing sense of separation, power, and entitlement, came with another momentous shift in human and earth history – the transition from egalitarian and nomadic hunting and gathering bands to sedentary and hierarchical agricultural societies rooted in dynamics of extraction and growth.

### The Agriculture Revolution and the Rise of “Civilization”

*“Forests precede civilizations and deserts follow them.” Francois-Rene de Chateaubriand*

*“The lesson I learned in the past is this: that the health of land and water - and of woods, which are the keepers of water – can be the only lasting basis for any civilization’s survival and success.” Ronald Wright (2005)*

*Hunter-gatherers practiced the most successful and longest-lasting life style in human history. In contrast, we're still struggling with the mess into which agriculture has tumbled us, and it's unclear whether we can solve it ... the adoption of agriculture, supposedly our most decisive step toward a better life, was in many ways a catastrophe from which we have never recovered.” Jared Diamond (1999).*

By the close of the Pleistocene, *Homo sapiens* had spread through most of the world, and had caused or contributed to the extinction of numerous megafauna. Their destructive impact on other species and

environments grew over time in proportion with their population growth, consumption levels, and technological and economic development. Upon migrating out of Africa, it took *Homo sapiens* only about 30,000 years to become a global species, and within another 10,000 years numerous human cultures had initiated a radical revolution in their mode of production, social relations, and relationships to other animals and the natural world as a whole. As stated, the shift from prey to predator was the first major upheaval in human history, as under-appreciated as this transformation was. But even with the dramatic impacts on biodiversity from big-game hunting, overkill, and territorial expansion, humans had barely begun to leave their mark on the world, for they still lived in small, nomadic bands of hunter and gatherers and only disrupted local – and not yet global -- environments and ecosystems.

The next major shift in the human mode of living came in the post-Ice Age climatic transition from the Pleistocene to the more temperate and stable conditions of the Holocene, and with the shift from paleolithic cultures to more advanced cultures that inaugurated the “Neolithic revolution” and emergence of agricultural society.<sup>8</sup> Once humans gradually abandoned nomadic hunting-gathering lifestyles in favor of sedentary existence based on agriculture and food production, they had effected a rupture from the entire past – 100,000 or 200,000 years -- of prior *Homo sapiens* existence and millions of years of history in the evolution of *Homo* species and ancestral hominins.

Some fifteen to ten thousand years ago, throughout the eastern Mediterranean and Near East, humans began to abandon nomadic hunting-gathering lifestyles in favor of settling in one area to produce their own food through farming. Instead of scavenging, small-scale hunting, taking foods found in nature, and roaming from one locale to another, humans began more to root themselves in one area, where they cultivated the plant and animal species deemed most useful. Rather than taking food (tubers, fruits, or carrion), or hunting small or large animals, they now were *producing* food and manipulating nature on a whole new level. In this process of *domestication*, humans cultivated plants and exploited animals that serve their purposes.

Once humans began to grow wheat and barley, to adopt and tame the offspring of scavenging wolves and adopt them in their societies, to pen and herd wild goats and sheep, and to breed animals for their purposes, they had abandoned hunting-gathering life in order to create *agri-culture*, a radically new social form, culture, way of life, and mentality. Once humans developed not only agriculture but also cattle-keeping, or pastoralism, they truly have laid the foundations for all history to come for, as Paul Shepard writes, the agriculturalists and herdsman of the Neolithic world forged “the two great paths leading into the civilized world, and without [their] myths, traditions, and economy the modern world would be incomprehensible” (2004:109).

Although the transition to agricultural society took different paths in different places, it always had the same destructive results, involving the replacement of comparatively harmonious relations among humans and between culture and nature with antagonism, disconnectedness, hierarchy, and unsustainable growth. Key to a complex of changes was the production of surplus goods and growth of the human population. With the resources available to sustain it, there was a burst in human population growth. For once humans could produce enough food resources to support burgeoning populations, they stepped outside of ecological constraints and moved from one collapsed ecological region to another, until they attained global status, and eventually had nowhere to run from the systemic planetary results of overpopulation, excess production, and unsustainable consumption of resources. Whereas all species including our closest ancestors lived as small populations within the constraints of local ecosystems that set limits on their numbers, agricultural society enabled humans to transcend the confines of local ecosystems and the limits they imposed on population growth and thereby expanded their numbers and geographical range.

Surplus production was crucial for the origin of hierarchy and domination as it generated a system of bureaucracy, a state structure, and the division of society into economic classes. Whereas hunter-gatherer societies consumed what they needed, shared what they had, and produced no surpluses, agricultural societies produced more than they needed and stored and traded their extra goods. Surplus goods allowed trading, and the increasing complexity of managing trade, investment, and defense required stronger leadership and produced chiefs, elites, and specialists. The surplus was siphoned off by those with an interest in wealth and power and accrued it through the possession of valuable goods. Surplus production allowed some individuals to remove themselves from labor and devote their time to writing, manufacturing, metallurgy, or serving in a professional army. Moreover, scribes and priests emerged to monitor and administer the resources, to plan and implement field use, to organize crop rotation, and so on, and thereby formed a privileged group in relation to manual laborers. Around all of this, a political state emerged to keep administrative records on census, taxes, currency, and trade. This generated the technology of writing and thus precipitated the transition from preliterate oral cultures to literate written cultures, one that can also write the records of history itself. Villages joined forces under the rubric of a centralized government, expanding the state's reach and power. Kin relations were engulfed by political affiliations as spiritual connections to animals and the land became purely instrumental and pursued the goal of control instead of harmony.

Whereas in hunting-gathering societies individuals often performed many tasks, in agricultural society a division of labor emerges whereby they are trained in specific tasks and functions. In hunting-gathering tribes individuals enjoyed a wholeness and integration of activity in society, but in agriculture their activities became specialized and fragmented, alienating them from the social totality. And as hunting-gathering bands were egalitarian and knew no patriarch, cult of experts, king, class, or state, in agricultural society one finds, alongside the domination of human over animal, the domination of men over women, wealthy classes over laboring classes, and, ultimately, the state over citizens.

As farming spread, so did ideas of ownership and private property. Quite unlike the use-oriented and egalitarian nature of hunting-gathering bands, agricultural societies were organized to advance the interests of powerful, wealthy, propertied elites through control of labor, slavery, warfare, and empire. The conflicts of small bands of foragers were replaced by large-scale military warfare; there was territory to acquire and protect.

Paleontologist Niles Eldredge sees the shift to agricultural society as momentous: "10,000 years ago, we became the first species to venture beyond the confines of the local ecosystem" (1997: 98). We empowered ourselves not only to *take from* nature, but also to *transform* it. Accordingly, humans approached nature less from an enchanted viewpoint than one that is detached, mechanist, and, ultimately, hubristic. As Eldredge notes, "We had removed ourselves from the fundamental position in nature that we had heretofore shared with absolutely all other species since life began: we abruptly stepped out of the local ecosystem. We told Mother Nature we didn't need her anymore; that we could take care of ourselves" (ibid: 93). Among other changes, Eldredge writes, "humans did not have to interact with other species for survival, and so could manipulate other species for their own use"; as well, "humans did not have to adhere to the ecosystem's carrying capacity, and so could overpopulate" (2001).

Andrew Bard Schmookler underscores this point. The shift to agrarian society was the most significant change in history, for "[w]hen plants and animals were domesticated, mankind began truly to depart from the place in the living order given to it by nature" (1995: 17). The genetic, biological, and environmental constraints on life forms, he argues, frayed and broke once humans produced a "civilization" that gave them significant powers to shape the natural world to their needs. With agricultural society, there emerged the "possibility of indefinite social expansion: more and more people organized over more and more territory" (ibid: 19). Colonization of the planet takes its first

giant step at this point as social forms shift from clans to villages to states and empires, as expansion requires ever more resources and leads to increasingly destructive impacts on the world.

With the production afforded by slave-based agriculture, rulers could afford to pursue conquest and expansion. With animals already enslaved, humans turned to enslaving their own kind. Whether or not slavery is necessary for civilization to emerge and expand, as some argue, it is certainly the case that the wealth, power, cities, and empires of civilization did grow through a powerful minority enslaving a vast majority. From Mesopotamia, Egypt, and China to Greece, Rome, and Ottomans to European nation states and the US, empires and powerful states arose through the exploitation of slave labor, such that the wealth and luxuries of elite classes grew only through the subjugation of working masses, just as rich and strong cities and states fattened on the resources of other societies they impoverished and destroyed. In the very “cradle” of western civilization, in Sumer and the Fertile Crescent, human societies exploited animals for food, clothing, transportation, and labor power.

Compared to hunter-gatherers, humans in agricultural society were less free, worked harder, were unhealthier, and had shorter life spans. In contrast to the “savagery” and “barbarian” nature of non-agricultural cultures, agricultural society became identified with “civilization” and, by the modern era, as the first significant step on the path toward “progress,” rather than constituting, for Diamond at least, “the worst mistake in the history of the human race” (1999). Since its inception, elites from agricultural societies sought to displace nonagricultural peoples, and indeed few hunting and gathering tribes exist today. Agriculture usurped other modes of living, expanded on a global scale, and became the dominant paradigm to which we remain beholden. Just as the human and social costs were devastating to laborers and newly oppressed and enslaved classes, so too agricultural societies had damaging environmental impacts.

The same trajectory that led to the rise of human empires in Mesopotamia, Greece, Rome, Mayan, and other cultures, led to their fall. Domesticated cows, pigs, goats, and sheep swelled in numbers and stripped grassland areas bare. Irrigation systems salinized and toxified land. The intensive patterns of growth, resource extraction, deforestation, habitat destruction, desertification, and overall ruination of their environments led to the collapse of their societies as well. Whether in Mesopotamia, ancient Greece and Rome, or Easter Island, humans annihilated forests and turned lush green zones into deserts and wastelands (see Hartmann 2004, Wright 2005, Diamond 2011). With few exceptions, major civilizations collapsed -- in important part -- because of unsustainable growth and exhaustion of their natural resources, as numerous social factors such as warfare also played critical roles. The same mistakes of depleting natural resources and violating the integrity and balance of ecosystems are repeated time and time throughout history, as they are now playing out dramatically on a global scale. Each time, however, these errors become more costly.

*Agri-culture* is still our basic paradigm. It is not only a mode of production but a social system, ideology, and worldview involving domestication of the wild, the domination of humans over animals and the earth and over one another, the naturalization of hierarchical systems and values, unsustainable growth, the concentration of people in overcrowded living quarters, and the spread of numerous diseases and viruses through the exploitation of animals. With Marx, we must see capitalism as a radical break with all prehistory, in its apotheosis of economic growth, profit, and competitive individualism over all other values and past lifeways. But, dialectically, it is also important to grasp capitalism as a continuation of agricultural society in its expansionistic and exploitative logics, unsustainable growth imperatives, hierarchical social organization, concentration of wealth, exploitation of labor, domination over nature, and blatant disregard for ecological dynamics. Capitalism absorbed agricultural systems and values and merged them with industrial technologies, mass production systems, profit and commodification imperatives, and expanded them on an even wider global scale. Capitalism is agricultural society in its most advanced and pathological state, one



involving expansionism, uncontrolled growth, the fetishization of money and wealth, the exaltation of competitive individualism, and the rule of private property, all in a market-dominated global context where society is reduced to economy.

Once capitalist ideologies and global market systems emerged, after the long stretch of premodernity, desires for power, property, and profit became completely unhinged from social restraints and swelled to utterly new levels of malignancy. With ideological support from Protestantism, greed and materialism were championed rather than condemned, consumerism grew cancerous, and everything was subsumed by the imperatives of commodification, industrialization, and mechanization. Capitalism spread throughout Western nation states to other continents, engulfing the world (by the late twentieth century) in a global economy dominated by ever-fewer and more powerful transnational corporations. Driven by a grow-or-die logic, inherently unsustainable, capitalism has devoured the earth's resources, spewed out pollution and poisons, and precipitated a planetary ecological crisis. In its urgent, ceaseless, frenetic quest to expand capital, capitalism is powered by an endless drive to surpass any and all constraints and limits to growth, whether they be past prejudices, traditional social forms, national and spatial barriers, or ecological laws. "Capital," Marx noted, "is the endless and limitless drive to go beyond its limiting barrier. Every boundary is and has to be a barrier for it' (1973: 334) -- a barrier to crush in the juggernaut of growth.

The modern dream of Progress as realized by infinite expansion of desires, multiplication of needs, endless consumption, and an alleged cornucopia of inexhaustible resources has become the 21<sup>st</sup> century's nightmare as the consequences of a fatally flawed epoch become visible and real.<sup>9</sup> The Industrial Revolution of the 19<sup>th</sup> century, the continued maturation of capitalist ideologies and social forms, unchecked growth powered by fossil fuels, and the consequent acceleration of global warming, humans had created not only a rupture in social history, but an entirely new geological epoch in earth history. With the expansion of the human empire over space and time, humans had brought to an end the Holocene epoch which provided the stability that allowed "civilization" to flourish. The much-disputed term "age of the Anthropocene" tries to mark the shift by which humans become a – perhaps the -- decisive force of planetary change, disrupting every major ecological system – e.g., atmosphere, biosphere, hydrosphere, cryosphere, and lithosphere. Most dramatically, however, humans – more precisely, industrial capitalism – have belched such a prodigious amount of heat-trapping greenhouse gases into the atmosphere as to begin warming the planet and unleash catastrophic climate change that now threatens all species, humans not excepted.

#### "Homo sapiens" and the Metastasis of Growth<sup>10</sup>

*"The present rate of increase of Earth's swarming population qualifies Homo sapiens as an ecological cancer, which will destroy the ecology just as surely as any ordinary cancer would destroy an organism." Isaac Asimov*

Few indicators dramatize the malignant ascendance of humans to a global and world-transforming species better than its geometric population growth rates. At the beginning of the Upper Paleolithic, Wright notes (2005: 44), humans numbered about a third of a million. With the onset of the agricultural revolution some 10,000 years, their population increased to 3 million. 5,000 years ago, with developed civilizations in Sumer and Egypt, humans swelled to 15 to 20 million. Human numbers grew to 500 million by 1000 CE, and first reached the billion mark eight centuries later, in 1804. At an ever-quickenening rate, the human population doubled to two billion in 1927, hit three billion in 1960, climbed to four billion in 1974, pushed to 5 billion in 1987, swelled to 6 billion in 1999, and hit seven billion in 2011.<sup>11</sup>

There is an obvious pattern of accelerating growth, and one can well understand why many theorists compare human growth rates to that of bacteria, infectious plagues, a metastasizing cancer, or a virus killing off its host (earth). If we start from a common date for the emergence of *Homo sapiens*, it took human beings just over 200,000 years to break the billion barrier, but only 130 years to expand to two billion, then only 30 years to add a billion more, just 14 additional years to grow to four, and a mere 12 more years to add yet another billion. “In less than a tenth of a percent of the total history of humanity, we’ve experienced over 90 percent of the total growth of the human population” (Hartmann 2004: 15).

In 2021, the human has surged to nearly eight billion people, and in terms of net gains (births minus deaths), the human population grows every *day* by 220,000 people, over 150 a *minute*, totaling over 80 million more people each *year*, roughly the size of the combined populations of California and Canada.<sup>12</sup> As Lynas describes, “Within the earth's biosphere, a single species has come to dominate virtually all living systems. For the past two centuries this species has been reproducing at bacterial levels, almost as an infectious plague envelops its host. Three hundred thousand new individuals are added to its numbers every day. Its population of bodies now exceeds by a hundred times the biomass of any large animal species that has ever existed on land since the beginning of geological time ... Nothing like this has happened before in the earth's history. Even the dinosaurs, which dominated for tens of millions of years, were thinly spread compared to the hairless primate *Homo sapiens*” (2004). As a global and world-altering species whose presence in ecosystems in even small numbers can have a dramatic impact, Lynas warns that “[i]nvariably, our productive and consumptive activities displace other living species from the planetary food web. The result is mass extinction, which has historically accompanied human expansion everywhere, from North America to Easter Island. Wherever humans dwell, other species die out - displaced from land cleared for agriculture, killed for their flesh, or simply allowed to disappear as an unnoticed by-product of the thriving primate economy” (ibid).

The geometric growth rate of humans is unprecedented and never in the history of the earth has a single species grown to such bloated proportions, completely out of balance with living systems. The problem is only worsening. On conservative estimates the human population is expected to swell upwards to 8-10 billion by 2050, and perhaps expand significantly by 2100. Human population growth represents a crisis of the highest order, but of course it is only one aspect of multiple crises -- including species extinction and climate change -- merging together in a perfect storm of catastrophe that forms the daunting challenges facing humanity in the Anthropocene.

Of course, there are ecological limits to human population growth and, as Thomas Malthus noted in the nineteenth century, if humans do not reduce their populations on their own foresight and volition, nature will correct the problem for them -- with plagues, diseases, famine, war, and mass death. Food, land, and water scarcities are already serious problems, and no miracle technological innovations will find ways to sustain human existence at the current rates of growth. One way or the other, whether humans reduce their own numbers or nature does the pruning for them, there is a ceiling beyond which human numbers cannot expand on an ever-shrinking planet of diminishing resources. The dramatic growth of human civilization in the nineteenth and twentieth centuries would not have been possible without the discovery and exploitation of stored sunlight power and the ancient dead remains of organisms in coal and oil deposits, which, as numerous theorists have argued, already reached peak levels decades ago, or are soon reaching them, and will rapidly decline by 2050 (see Heinberg 2005, Rupert 2009). The exploitation of coal deposits to power the rapid growth of industrial capitalism was an unrepeatable one-and-done shot, and precipitated the current climate crisis.

At the five billion year mark, humans became the most numerous species on the planet in terms of total biomass, and by 1990 their numbers exceeded all other mammalian species, even eclipsing rats (Hartmann 2004: 15) Beginning around 1980, Lester Brown (2008) argues, humanity's demands on the earth began to exceed its regenerative capacity. “*Homo colossus*,” in William Catton's apt term (1982)

describing voracious human appetites, has colonized nearly half of the planet's ice-free land areas. Humans consume over 40 percent of the solar energy captured by planets and 54 percent of the earth's available fresh water (Chen 2005: 282). 80 percent of the world's grasslands and 40 percent of the planet's land surface suffer from soil degeneration. Humans shrink the earth's forest cover by forty million acres each year (Larsen 2004). Every hour, 1,500 acres of land become desert (Hartmann 2004: 45). As things now stand, *Homo colossus* has destroyed half of the world's rainforests, decimated a quarter of shallow coral reefs, and depleted or overfished seventy per cent of the major marine fisheries. Already, using technologies such as bottom-trawling nets that scrape along ocean floors and strip up everything in their path, humans have sucked up ninety percent of the large fish in the ocean; scientists predict that by 2050 world fish populations will collapse as a result of gluttonous appetites (Black 2006). The combination of advancing deserts (such as caused by overgrazing) and rising seas is rapidly shrinking the land area that can support human habitation (Brown 2006).

The pace of destruction by the human locust is utterly mind-boggling. As Thom Hartmann notes: "In the 24 hours since this time yesterday, over 200,000 acres of rainforests have been destroyed in our world. Fully 13 million tons of toxic chemicals have been released into our environment, Over 45,000 people have died of starvation, 38,000 of them children. And more than 130 plant and animal species have been driven to extinction by the actions of humans ... And all this just since yesterday" (2004: 1). Penned seventeen years ago, these numbers have climbed higher still. Lester Brown notes that "Resources that accumulated over eons of geological time are being consumed in a single human lifespan. We are crossing thresholds that we cannot see and violating deadlines that we do not recognize" (2007). As Jim Chen writes, "We may be witnessing the first geological episode in nearly 400 million years – or perhaps even 2.2 billion years, if we prefer counting back to the boundary between the Archaean and Proterozoic eras of Precambrian time – in which rampant success of one form of life has doomed many unrelated species" (2005: 288-289).

Yet the recipe for human "success" also is the formula for its failure and potential demise. In general, human "success" in colonizing the earth threatens others species with oblivion, leaving them increasingly small (and environmentally challenged) spaces. In the dysfunctional zero-sum game of "progress," humans "gain" at the expense of other species and the environment, but this is a Pyrrhic victory that calls into question the future for humans and pushes them ever-closer to becoming a *failed species*. While atavistic ideologues like Tibor Machan (2004) still publish books such as *Putting Humans First: Why We Are Nature's Favorite*, it is more accurate to see *Homo sapiens* as the invasive species and agent of mass extinction par excellence -- not "nature's favorite," but rather nature's *bete noir*.

The human species has exceeded all ecological boundaries and has grossly overextended its presence on this planet, such that it has become a malignant force devastating the natural environment and robbing life from other species and future human generations. *Homo sapiens*, this "wise man" and crown of creation we pretend to be, has stripped the earth bare of its rich fruits, turned grasslands into deserts, reduced rainforests into smoldering ash, choked the atmosphere with toxic gases, and degraded oceans into seas of acid. We have entered the urban age, such that by 2030 two-thirds of the human population will live in cities, many in mega-cities such as Mumbai or Sao Paulo that will swell with over ten million or even twenty million, while over a billion people – one eighth of humanity – will live in filthy and disease-producing slums as a consequence of globalization, IMF and World Bank policies, and its exploitative "structural adjustment programs" (see Doyle 2006 and Davis 2006).

To be sure, the ecological impact of middle-class and affluent Westerners is far greater – some twenty-seven times per capita the amount of resources consumed in undeveloped nations. We must not forget that "[m]ost people in the world live in poverty. 85% of the world live on less than \$30 per day, two-thirds live on less than \$10 per day, and every tenth person lives on less than \$1.90 per day" (Roser and

Ortiz-Ospina 2019). We cannot grasp the multiple causes of the current crisis if we examine population growth only from a quantitative rate, we must also focus on the qualitative and uneven types of consumption and their environmental impacts as well as the ecocidal institutions underpinning unsustainable human growth. Abstract references to “humans” or “humanity,” such as commonly deployed by overpopulation theorists and in Anthropocene discourse, obfuscate crucial inequalities and levels of responsibility for social and ecological crises. They must not only be qualified or replaced by phrases such as “advanced industrial nations” and “wealthy and elite consuming classes,” but, more specifically, “corporations and capitalist economic and political elites,” and a structural understanding of the requirements, operations, and inevitable consequences of global capitalist systems. Yet human populations everywhere continue to grow and expand, as resources steadily dwindle. The problem of *sheer numbers* (people who require land, food, and resources) is evident in how the expanding territories of poor African villages overtake wildlife habitat and bring humans and elephants into ever-sharper conflicts. Many poor people hunt illegally or traffic in endangered species. Indian villages are invading tiger reserves and driving them into oblivion. These destructive ecological practices, of course, are directly related to poverty, underdevelopment, and global capitalism and underpin the need to link social justice and ecological issues. Yet in the most populous regions of the world in China and India, rising middle classes bring greater demand for meat and consumer luxuries, which, combined with enormous numbers of newly baptized members of the consumer class, portends utter calamity.

### The Sixth Extinction Crisis

*“Species extinction is the fuel that supports the ever increasing progress of the machinery of civilization.” Captain Paul Watson (2015)*

*“The spread of modern humans out of Africa has caused a sixth mass extinction, a greater than 40,000-year event extending from the disappearance of Ice Age mammals to the destruction of rainforests by civilisation today.” Nicholas R. Longrich (2019)*

*“There is little doubt left in the minds of professional biologists that Earth is currently faced with a mounting loss of species that threatens to rival the five great mass extinctions of the geological past.” Niles Eldredge (1997)*

Humans began their journey throughout the world in small, nomadic, egalitarian bands known as hunting and gathering societies. Lacking property, surplus production, classes, or hierarchies of any kind, these social forms comprised the vast bulk of human history, whereas the stratified, hierarchical societies many take to be eternal and natural emerged only around ten thousand years ago. In this relatively short time span, however, humans have created rapidly changing, growing, and unsustainable dominator societies that now threaten to implode under the weight of their dysfunctional modes of organization and relation to the natural world. “Socialism or Barbarism!” was the cry of the late nineteenth and early twentieth centuries, but in the age of the Anthropocene, when capitalism’s contradictions are fully playing out on a planetary scale, this phrase today would have to be recast as “Socialism or Ecological Collapse!”

One of the key contradictions of capitalism is that its expansion rates are so rapid and vast that the system consumes ever more of the life systems necessary for humans to survive. Capitalism destroys its own conditions of reproduction – the *biological foundation* of life on which it parasitically depends. As Ashley Dawson observes, “there is no clearer example of the tendency of capital accumulation to destroy its own conditions of reproduction than the sixth extinction” (2016: 14). Driven by a grow-or-die logic, inherently unsustainable, capitalism has devoured the earth’s resources, spewed out pollution and poisons, and precipitated a planetary ecological crisis. Just as global warming is a by-product of industrial society, so extinction is a necessary consequence of capitalism. As I have argued, the roots of

the current sixth mass extinction crisis like not in capitalist modernity but rather in the extermination of the megafauna by early modern humans in the late Pleistocene. Yet capitalism greatly accelerates this process, exploiting advances in science and technology to expand a profit-driven, energy intensive global economy to every region of the world, thriving off the creation of new markets and “needs.” In its urgent, ceaseless, frenetic quest to expand, capitalism is powered by an endless drive to surpass any and all constraints and limits to its growth, whether past prejudices, traditional social forms, national and spatial barriers, or the laws and fixed needs over every ecosystem. “Capital is the endless and limitless drive to go beyond its limiting barrier,” Marx writes. “Every boundary is and has to be a barrier for it’ (1973: 334) -- a barrier to crash in the juggernaut of growth and expansion.

The modern dream of Progress as realized by infinite expansion of desires, multiplication of needs, endless consumption, and inexhaustible resources has become the 21<sup>st</sup> century’s nightmare as the consequences of a fatally flawed era of fossil capitalism has become dramatically visible and painfully real.<sup>13</sup> With the Industrial Revolution of the 19<sup>th</sup> century, the continued maturation of capitalist ideologies and social forms, an energy source based on burning massive quantities of fossil fuels, and the consequent acceleration of global warming, “humans” – or mainly economic and political elites (let us again be aware of the political entanglements of this abstraction) -- in advanced industrial society created not only a shift in social history, but an entirely new geological epoch in earth history. With the expansion of the human empire over space and time, humans had brought to an end the Holocene epoch which provided the stability that allowed “civilization” to flourish. The much-disputed term “age of the Anthropocene” tries to mark the shift by which humans become a – perhaps the -- decisive force of planetary change, disrupting every major ecological system, but most dramatically the atmosphere through belching millions of metric tons of greenhouse gases into the air and creating runaway climate change in all its horrifying aspects.

The human growth trajectory described above is unprecedented; never in the history of the earth has a single species grown to such bloated proportions, overwhelming all other species, increasingly out of balance with and in contradiction to living systems. *Homo sapiens* has emerged as an agent of mass extinction and whereas past extinctions have all been caused by external factors such as volcanism or asteroid strikes, the current extinction crisis is caused from within, by a malignant species. “And because *Homo sapiens* is clearly a species of animal (however behaviorally and ecologically peculiar an animal),” Eldredge notes, “the Sixth Extinction would seem to be the first recorded global extinction event that has a biotic, rather than a physical, cause” (2001).

The past reveals our dark history of genocide, overshoot, overkill, and boundless plunder, and humans are now pushing countless species to oblivion at an alarming rate. According to the World Wildlife Fund’s “Living Planet Report” (2018), “[p]opulations of mammals, birds, fish, reptiles, and amphibians have, on average, declined by 60% between 1970 and 2014,” as “[a] fifth of the Amazon has disappeared in just 50 years.”<sup>14</sup> In just over 40 years, in other words, we have lost over one half of the animal population. On land, and in rivers and seas, humans are killing animals in horrifying, unsustainable numbers, as they pollute or destroy animal habitats. The report find that the main drivers of biodiversity decline are the overexploitation of species, agriculture, destruction of habitat, and the global wildlife trade. Presenting “a sobering picture of the impact human activity has on the world’s wildlife, forests, oceans, rivers, and climate,” this report issues a stern warning to humanity, noting: “We’re facing a rapidly closing window for action and the urgent need for everyone—everyone—to collectively rethink and redefine how we value, protect, and restore nature” (World Wildlife Fund 2018).

Incredibly, humans and cattle now constitute 96% of all mammals on earth (60% are livestock, 36% are humans), and wild mammals’ numbers have fallen to a mere 4%. Humans – 0.01% of all life -- have wiped out 83% of species off the face of the earth and had a disproportionate and disastrous

impact on this planet (Carrington 2018). In 2019, one year after the comprehensive WWF report, the United Nations' Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) committee issued another shocking and authoritative report on conditions. This is the first global biodiversity assessment (largely focused on North America and Europe) since 2005 and the first carried out by an intergovernmental body.<sup>15</sup> In their summary of this 1,148-page document (see IPBES 2019b), the IPBES warns that “Nature is declining globally at rates unprecedented in human history — and the rate of species extinctions is accelerating, with grave impacts on people around the world now likely ... The health of ecosystems on which we and all other species depend is deteriorating more rapidly than ever. We are eroding the very foundations of our economies, livelihoods, food security, health and quality of life worldwide” (2019a).

According to the report, human actions have significantly altered three-quarters of the land-based environment and nearly two-thirds of the marine environment have been significantly altered by human actions. Moreover, over a third of the world's land surface and nearly two-thirds of freshwater resources are now devoted to crop or livestock production. Most disturbingly, the report finds that human beings are rapidly accelerating the decimation of wildlife, and are on track to obliterate an “unprecedented” *one million* plant and animal species, many within decades. Summarizing the systemic ecological crisis rapidly unfolding, Josef Settele, a co-chair of the report, writes: “Ecosystems, species, wild populations, local varieties and breeds of domesticated plants and animals are shrinking, deteriorating or vanishing. The essential, interconnected web of life on Earth is getting smaller and increasingly frayed. This loss is a direct result of human activity and constitutes a direct threat to human well-being in all regions of the world” (IPBES 2019a).

The chief cause of species endangerment and extinction is habitat loss, such as induced by mining, forestry, and agriculture – above all, the industrial farming of animals for human food consumption. Over the past several decades, the land range of 173 species of mammals around the world has been halved, and humans are driving species to extinction far more prolifically than the natural world. As E.O. Wilson writes, “Paleontologists estimate that before the global spread of humankind the average rate of species extinction was one species per million in each one- to 10-million-year interval. Human activity has driven up the average global rate of extinction to 100 to 1,000 times that baseline rate. What ensues is a tragedy upon a tragedy: Most species still alive will disappear without ever having been recorded” (2018). According to Paul Watson, “we are now losing species faster than they can be replaced and entire ecological niches are being vacated permanently” (2007). In the process, humans are systematically destroying the life support systems upon which they and other life forms depend. As Wilson underscores, “The worldwide extinction of species and natural ecosystems, however, is not reversible. Once species are gone, they're gone forever. Even if the climate is stabilized, the extinction of species will remove Earth's foundational, billion-year-old environmental support system” (2018). Thus, the integrity of biodiversity and ecological systems are intricately intertwined.

To fully appreciate this point, we must shift our standard perspective. It is not just the large charismatic animals such as the African elephant, rhinos, and lions, and whales who are threatened with extinction, but also pollinators and insects who are key to the planet's life support systems. Bees, ants, and beetles are vanishing eight times faster than mammals, birds or reptiles (Bayo and Wyckhuys 2019). Bees are dying in droves, due to a human-induced “bee colony collapse disorder” (see Klein and Barron 2017). Bee colony collapse disorder is only part of a greater “insect apocalypse” that humans have brought about. In a recent major study, researchers Francisco Sanchez-Bayo and Kris Wyckhuys (2019) argued that insect populations have declined by over 75% over the past 25 years, and the planet may be nearly devoid of them by the next century, except for flies and other species that pester us. This is equivalent, they argue, to “the most massive extinction episode” since the dinosaurs disappeared. The potential collapse of insect populations would be enormously consequential as they provide food sources for other animals, pollinate three-quarters of the world's food crops, recycle wastes, and replenish soils.

Humanity is thereby in the midst of causing a catastrophic collapse of nature's ecosystems, killing of species and disrupting vast intricate webs of life. "There is reason to worry," says Sanchez-Bayo, "If we don't stop it, entire ecosystems will collapse due to starvation" (cited in Main 2019).

Clearly, our fates are intertwined, and what we do to the animals, we do to the environment and to ourselves. Because nature is in trouble, we are in trouble. Like a dying body on life support, the planetary ecosystem is breaking down, system by system. As Sir Robert Watson, chair of the IBPES, states in the 2019 IPBES report, further massive losses in biodiversity can be forestalled, but only through radical "transformative change," or "a fundamental system-wide reorganization across technological, economic and social factors, including paradigms, goals and values" (cited in Al Jazeera 2019). These are polite terms for revolution.

We see two disturbing, directly interrelated trends: rising human populations (approaching 8 billion) and falling biodiversity. This is a zero-sum game of growth, where human numbers grow at the expense of biodiversity. "During the past fifty years, the planet's human population has doubled. In that same period, the size of the global economy has quadrupled, and global trade has grown tenfold. If hundreds of millions of people around the world are still mired in poverty, there are many more people living in prosperity today than ever before" (Kolbert 2019). By all key indicators, we are in the midst of the planet's sixth great extinction crisis, the last one occurring 65 million years ago with the demise of the dinosaurs (see Leakey and Lewin 1996; Kolbert 2015; Ceballos et. al. 2015). Unlike the past 5 major extinction events, the present wave of annihilation is caused not by *natural* phenomena such as volcanic explosions and meteor strikes, but rather by *human* actions, including rainforest and habitat destruction, overhunting and wildlife trafficking, and the industrial exploitation of animals for food. This time, *humans* are the meteor striking the earth and the ramifications of their presence is rippling throughout the globe like a tidal wave. And unlike the megalith that smashed into the Gulf of Mexico, the human asteroid keeps hitting the planet, over and over again, with ever greater force, never allowing for the planet to stabilize itself.

Some scientists like Smithsonian paleontologist Doug Erwin and science journalist Peter Brannen are skeptical of talk of a sixth mass extinction, and argue that this is facile and hyperbolic language widespread throughout recent "junk science" journalism used to describe losses that are relatively minor compared to past extinctions (see Brannen 2017: 244-248). Despite recent losses in biodiversity, Erwin and others argue, we are still a long way from a genuine mass extinction, such as the end-Permian extinction 250 million years ago which wiped out 96% of species and almost ended the pulse of life on earth. "[H]umanity has not yet come anywhere even remotely close to the death tolls of the major mass extinctions of the past half-billion years ... yet," Brannen writes adding the crucial qualification "yet" (ibid: 240). The claim for a sixth mass extinction, however, seems to be that one is, and has been for about 20,000 years, *in process*, rather than fully manifest now, as if the earth was a ghost town or fireball. Brannen strains credulity even more when he adds, "If fact, biodiversity is still flourishing" (ibid: 241). To argue that we are not "yet" in a new mass extinction is one thing, to claim that biodiversity is "still flourishing" is a quite different and mind-boggling statement.

Erwin explains his position further, adding that "[w]hen mass extinctions hit, they don't just take out big charismatic megafauna, like elephants, or niche ecosystems, like cloud forests. They take out hardy and ubiquitous organisms as well – things like clams and plants and insects" (ibid 248). Erwin ignores recent research which, if right, demonstrates that "ubiquitous organisms" like insects and bees are dying off. His insistence that bona fide "[m]ass extinctions kill almost everything on the planet" (ibid: 248) strikes me as an overstatement as past mass extinctions such as the end-Cretaceous left sufficient life for biodiversity to regenerate. Moreover, Erwin begs the question (admittedly within the span of a short and edited interview with Brannen) of whether or not we are rapidly, at the very least, *entering* into a new mass extinction era and global crisis brought on by climate change. Massive ecological



collapse, Erwin argues, occurs once we begin to cross tipping points, for “once you go over a certain line, a line that perhaps doesn’t even appear all that remarkable, all is lost” (ibid: 248). But, considering how rapidly ice sheets are collapsing, rainforests are shrinking, species are vanishing, and global temperatures are rising, are we not in fact living in another terrifying moment of geological history when numerous tipping points are simultaneously being crossed? And does not the exponential leap in natural extinction rates constitute a new mass extinction event or process underway?

### Runaway Climate Change in the Anthropocene

*"When the earth's deposits of fossil fuels and mineral resources were being laid down, Homo sapiens had not yet been prepared by evolution to take advantage of them. As soon as technology made it possible for mankind to do so, people eagerly (and without foreseeing the ultimate consequences) shifted to a high-energy way of life. Man became, in effect, a detritivore, Homo colossus. Our species bloomed, and now we must expect a crash (of some sort) as the natural sequel." William Catton (1982)*

*"It may seem impossible to imagine that a technologically advanced society could choose, in essence, to destroy itself, but that is what we are now in the process of doing." Elizabeth Kolbert (2012)*

What seemed impossible, and what scientists once dismissed as improbable – the ability of human beings to disrupt the planetary ecology -- is now a fact. *Homo sapiens* – the super-predator, all-devouring, hyper-technological, global species out of control -- has intervened in the natural world to the extent it has dramatically upset and destabilized every planetary ecosystem on land, at sea, and in the atmosphere, precipitating numerous ecological crises including runaway climate change.

Since the Industrial Revolution in the mid-nineteenth century, with the rise of the world capitalist system powered by the burning of fossil fuels, and especially after the post-World War II growth surge known as the “Great Acceleration,” human beings – above all in the developed West -- have increased the average overall global temperature over 1 degree Celsius (about 2 degrees Fahrenheit) since 1880, and two-thirds of this warming has occurred since 1975 (Earth Observatory: 2020). This seemingly insignificant difference of 1 degree Celsius yields enormous changes, such as we are now experiencing globally – from the collapsing ice sheets of Antarctica to the wildfires engulfing the US west, from the heat waves baking Europe to the dying coral reefs of Australia.<sup>16</sup> “Every extra bit of warming matters,” says Hans-Otto Pörtner, co-chair of a recent UN Intergovernmental Panel on Climate Change (IPCC) Working Group, “especially since warming of 1.5 degrees C or higher increases the risk associated with long-lasting or irreversible changes, such as the loss of some ecosystems”(cited in Miller 2018).

The Greenhouse Effect and the role of carbon dioxide in warming the planet was understood as early as the nineteenth century. The role certain gases played in trapping heat on the planet was first described in the 1820s by French physicist, Joseph Fourier. In 1859, Irish physicist John Tyndall identified carbon dioxide as a greenhouse gas, and in 1896, Swedish scientist Svante Arrhenius predicted that doubling the amount of carbon dioxide in the environment would warm the planet by roughly 4 degrees Celsius (Brannen 2017: 48). The most credible science has proven that there is a causal relationship between rising fossil fuel consumption since the Industrial Revolution and warming of the planet. We must be clear: climate change is not a problem of the future, it is wreaking havoc right now; it is not slowly unfolding, it is happening with breathtaking speed and will accelerate ever-more rapidly as feedback loops reinforce one another.

Since the 1950s, scientists have increasingly warned humanity of the risks of global warming, and identified an increase of 2 degrees Celsius as the threshold point to stay under to avert catastrophic consequences.<sup>17</sup> Should global temperature rise just one more degree Celsius, in other words, given that *we are already more than halfway there*, runaway climate change would commence and

dramatically exacerbate and multiply the crises afflicting the social and natural worlds. The phrases “runaway climate change” or “climate emergency” are meant to capture the horrifying realities that are not only looming for humanity, but are already underway. We are talking about accelerating mass extinction, rapidly melting ice caps and glaciers, rising seas and flooded cities and coastal areas, ever-more frequent superstorms, killer heat waves, chronic megadroughts, massive wildfires, surging disease rates, chronic food shortages and starvation, desertification of a third of the world’s land surface, mass migrations of hundreds of millions of people, unmanageable social chaos, authoritarian state control, chronic resource wars, spikes in terrorism, and the ever-sharpening division of the world between the elite minority clinging to life and privileges and the dispossessed majority desperately struggling for survival within what the United Nations recently called a global “climate apartheid” (see Carrington 2019).

To mitigate social and ecological catastrophes and keep global temperatures “well below” the threshold of 2 degrees Celsius (3.6 °F) to no more than 1.5 degrees, nearly 200 nations joined together in December 2015 to sign the Paris Agreement. This seemed to be a landmark achievement in the history of humanity and a hopeful sign – after decades of complacency, denial, and failed efforts such as the Kyoto Protocol -- that reasonable minds might prevail over unrestrained growth and greenhouse gas emissions. But inertia, lack of will and cooperation, and growth-addiction prevailed as the crisis spirals out of control. In 2017, rather than continuing or improving on a trend of levelling off global emissions in 2014-2016, they began to *climb* again, in line with a *still-growing* global economy and *record increase* in global energy demand. According to one analysis, “The Rhodium Group [an independent research organization] noted that U.S. emissions had increased 3.4 percent in 2018, whereas the Global Carbon Project reported that carbon emissions worldwide, which were largely flat from 2014 to 2016, had increased by 1.6 percent and by 2.7 percent in 2017 and 2018, respectively” (Encyclopedia Britannica: 2015). This was an all-time high in global emissions, occurring when the world economy expanded by 3.7 percent, and underscores the need for far more ambitious goals.<sup>18</sup>

By 2018, the world was burning 80% more coal than it did in the year 2000 (Wells 2019: 178).<sup>19</sup> But, already by 2016, the world had exceeded *another* threshold limit for runaway climate change -- the 350 parts per million (ppm) of atmospheric carbon dioxide benchmark – by topping 400 ppm (of carbon dioxide concentrations) and climbing. This staggering fact is only comprehensible in comparison to the distant past: “The last time the planet had a concentration of 300 to 400 ppm of CO<sub>2</sub> in the atmosphere was during the mid-Pliocene, 3 million years ago — recently enough for the planet to be not radically different than it is today ... To find a time when the planet’s air was consistently above 400 ppm you have to look much farther back to the warm part of the Miocene, some 16 million years ago, or the Early Oligocene, about 25 million years ago, when Earth was a very different place and its climate totally dissimilar from what we might expect today” (Jones 2017).

Since 2001, we have seen 18 of the 19 warmest years ever in human history and nearly every year that that passes now is hotter than the year before. More than half of all carbon emissions that humans have pumped into the atmosphere have come in the last 30 years, *in full awareness of what we were doing and despite all the climate advocacy and green energy initiatives* (Wells 2019: 4). World economies are growing, not shrinking, and emissions will therefore continue to rise. The human population of nearly 8 billion people may soon climb to 10 billion or more (Barrie: 2019). The world’s two most populous nations, China and India, are rapidly modernizing, and creating ever-greater consumer-oriented middle classes, while on a building spree of new power plant construction to meet rising demand (The Economist: 2019). In China, Africa, Latin America, the Middle East, and every nation where average income levels are rising, meat consumption -- a major contributor to climate change and every major environmental problem -- is increasing as well.

To meet growing global energy needs industry giants such as ExxonMobil are rushing full-speed ahead to extract and burn all the coal and oil deposits still left (The Economist 2019; Cole 2019).<sup>20</sup> As well, they increase other types of fossil fuel infrastructure such as natural gas and drilling pipelines, using “fracking” techniques to extract natural gas -- a supposedly “clean” energy source -- from rocks. But fracking releases large amounts of methane gas, a greenhouse gas about 30 times more harmful than carbon dioxide emissions. Fossil fuel industries see climate change as a business opportunity, not a planetary crisis, and melting ice at the poles just means open sea lanes and access to new reserves. Desperate to conceal their pathological greed and nihilistic indifference to life, for decades big energy industries have spread disinformation and greenwashing campaigns about the dangers of climate change that of which *they have been aware for decades* (see below).

These campaigns have been effective on public opinion which, certainly in the US remains largely ignorant and apathetic, and have effectively created doubt over the true causes and dangers of climate change. In advanced nations like the US, fossil fuel corporations spend billions of dollars to undermine climate science and clean energy policies, and billions more lobbying politicians (see Noel 2016 and Kirk 2020). The love affair between energy corporations and the US state is reciprocal, as government provides about \$20 billion dollars of subsidies a year to the fossil fuel industry (Coleman and Dietz 2019). At a time when global cooperation and action reached extreme urgency in 2016, the Trump administration pulled out of the Paris Agreement, as it aggressively censored climate change science, even scrubbing mention of climate change from government websites. No one in industry, government, or media dares the challenge the fundamental religion of modernity – economic growth – and any mention of the crucial need for *de-growth* is blasphemy and a sure sign of insanity, atavism, or communism.

Many have argued that the gold standard of the Paris Agreement itself is highly flawed, given that is proposals for staying under the 2 degrees Celsius threshold are based on speculative assumptions about carbon capture technologies that likely will not materialize, making its goals more compatible with 4 degrees warming, not 1.5 (see Hickle 2017 and 2018). IPCC reports, and scientists generally, “tend toward reticence and caution, erring on the side of ‘least drama,’ and downplaying more extreme and more damaging outcomes,” lest they be stigmatized as “alarmists” and incur mockery, loss of funding, and career damage (see Sprat 2017).<sup>21</sup>

Nonetheless, we need to emphasize that the world is speeding headlong toward disaster in flagrant disregard of science, and that rhetoric, policy-making, and global agreements thus far have amounted to nothing. Since the 1950s, scientists have been issuing stern warnings to corporations and governments about the growing dangers of greenhouse gas emissions (see Rich: 2019). Duly informed by internal researchers, companies such as Exxon initially took climate change seriously and funded more research before, during the 1980s, suddenly reversing course. Exxon suppressed its own findings, and launched disinformation and greenwashing campaigns to deceive the public, following the exact same pattern of the US tobacco industries whose CEOs -- fully aware from internal research that tobacco is highly addictive and that smoking causes cancer -- lied about both facts to Congress and the public in 1994. As Wells observes, “We have now done more damage to the environment knowingly than we ever managed in ignorance” (cited in Illing 2019). If available knowledge of the causes and magnitude of the problem of climate change thus far mean nothing, it is because of the immense economic, political, and ideological power of fossil fuel industries; because advanced industrial societies are addicted to coal, petroleum, and natural gas; because capitalist societies are irrational, profit-driven enterprises dedicated to private enrichment and short-term needs, rather than to the collective good and sustainable policies; and because class dominated societies suppress democratic decision-making and rational input from below.

On the world's current trajectory, many scientists predict, global temperatures will reach 2 degrees Celsius by 2050, and climb 3, 4, or even 7 degrees higher by the end of the century (Wells: 2019). We are already seeing the dramatic impacts of climate change happening at just over 1 degree Celsius warming, it staggers the mind to imagine how worse things social and natural crises will become if global temperatures double or triple. *Catastrophic climate change is now inevitable*, the question is only how truly terrible it will be. No matter what human societies now do, even if they miraculously ended all greenhouse gas emissions overnight, global warming is already baked into the future and we are almost certain to exceed two degrees warming quite soon. The reality is even worse than revealed by scientific reports, given regular biases toward caution, failure to account for feedback loops that accelerate climate change, and neglect of the impacts of other greenhouse gases, such as methane and nitrous oxide.

As I write, in late July 2021, record heat, drought, and wildfires are searing California, the Pacific Northwest, Southwest and central US (even Canada experienced record high temperatures and scores of fatalities), as unprecedented flooding bulldozed towns from Belgium to Germany. Rare and "once in a century" disasters are now common. In an article published on July 28<sup>th</sup>, nearly 14,000 scientists signed onto an initiative declaring a worldwide climate emergency, noting an "unprecedented surge" in climate-related disasters, with several tipping points immanent. Describing all-time highs in atmospheric CO<sub>2</sub> and methane in 2021; rapid melting of Greenland and Antarctica ice sheets; record shattering heat waves and wildfires; rising sea levels, devastating cyclones, hurricanes, and flooding through the world; growing livestock numbers; rapid degradation of warm-water coral reefs; and a 12-year high record annual loss rate of the Amazon rainforest in 2020, researchers found "mounting evidence that we are nearing or have already crossed" a number of climate tipping points, and called for "urgent action to decarbonise the global economy and start restoring instead of destroying nature." The authors identified "the overexploitation of the earth" as the "root cause" of the climate crisis and other "planetary boundary transgressions" (Ripple, William J. et.al. 2021). And just one day later after the publication of this report, July 29<sup>th</sup>, marked "Earth Overshoot Day" for 2021, the date when humanity's demand for energy and resources exceeds what the earth can regenerate in the year.

In October 2018, the IPCC released a startling report on the impacts of global warming of 1.5°C above pre-industrial levels (2018). The report argued that to stay under the 1.5 Celsius warming threshold and avert far more serious consequences of climate crisis, global carbon emissions must be fall by 45% (from 2010 levels) by 2030 and be reduced to net zero by 2050. The report urges world governments to immediately take "rapid, far-reaching and unprecedented changes in all aspects of society" to avoid disastrous levels of warming, and warns that the planet will reach the crucial threshold of 1.5 degrees Celsius above pre-industrial levels as early as 2030. The window of opportunity – roughly a decade away – is rapidly closing. Indeed, in order to make the decisive political commitment so that carbon emissions can peak by 2020, the world has perhaps only a few years to make the necessary changes. "The climate math is brutally clear," says Hans Joachim Schellnhuber, director of the Potsdam Climate Institute, "While the world can't be healed within the next few years, it may be fatally wounded by negligence until 2020" (cited in McGrath 2019). In his highly critical 2019 report submitted to the U.N. Human Rights Council, Philip Alston excoriated not only capitalist claims to bringing progress and prosperity to the world, but the complacency and inactivity of world governments on the climate change emergency. Alston sternly noted that "States have marched past every scientific warning and threshold, and what was once considered catastrophic warming now seems like a best-case scenario" (2020).

By the end of the century, the world may well not only be unrecognizable (denuded forests, melted icecaps, flooded coastlines), much of it will be uninhabitable due to heat, drought, and flooding. The altered atmosphere humans have created, as industries continue to spew massive volumes of greenhouse gases into the atmosphere each day, will play out for thousands, perhaps tens of thousands

of years. The scale of the climate crisis, and the level of response needed to overcome it, is almost unimaginable, and many like climate activist Bill McKibben and climate scientist Michael Mann liken the magnitude of the required response to a World War II mobilization (see McKibben 2016 and Bonn 2019). Yet, in nearly every major way, humanity collectively is *failing disastrously* to meet the challenge of climate change (see Roberts 2020). Climate change is not a technological problem, it is a political problem; the obstacles are not lack of knowledge and understanding, but rather capitalist growth and profit imperatives and the social relations that advance and protect this system. It is also a problem of overcoming inertia, apathy, and ignorance; of forming a collective global will to change; of remaking society as we know it; and of building global resistance movements as formidable as the powers we must confront.

Climate change has brought about an entirely new epoch in the history of planet earth, rapidly transitioning from the stable and temperate world of the Holocene into a new Anthropocene epoch marked by dramatic instability, extreme weather conditions, and the furies of nature, all brought on by the growing dominance of human as a malignant planetary force. We already live on what NASA scientist James Hansen calls “a different planet.” The human presence has grown so great that in a significant sense it has brought about what McKibbin (2006) calls the “end of nature.” Now that the human species has altered the world’s climate, there is not a raindrop or breeze that is not somehow influenced or altered by its existence.

### The Decline of the Human Empire

*"That's the premise of your story: The world was made for man. Your entire history, with all its marvels and catastrophes, is a working out of this premise." Daniel Quinn, Ishmael*

*"It's all a question of story. We are in trouble just now because we do not have a good story. We are in between stories. The old story, the account of how the world came to be and how we fit into it, is no longer effective. Yet we have not learned the new story." Thomas Berry, The Dream of the Earth*

Just one among millions of animal species – many on the brink of extinction and numerous yet to be discovered – *Homo sapiens* has risen from humble mammalian origins millions of years ago to become the most dominant, violent, predatory, and destructive animal on the planet. In a journey without precedent, *Homo sapiens* evolved from vulnerable prey to apex predator, from threatened species to threatening species, from pockets of Africa to planetary domination.

Blasting off on a rapid trajectory of growth and change some 50,000 years ago, *Homo sapiens* wrought social and ecological devastation everywhere it went. As its empire expanded in size, scope, and complexity, so too did its destructive impact and murderous legacy. Throughout their history, and as they migrated from Africa to Europe and other continents, humans survived and flourished because they adapted to change. Through their advanced technologies and cultures, they prevailed where their human cousins, *Homo neanderthalensis*, possibly failed to adapt to change and competition and died out. “The common theme of this evolutionary epic,” McKie observes, “is that, in the face of increasing climatic uncertainty, human beings evolved more and more flexible responses – widening their territorial ranges through upright locomotion, expanding their diets, opening up new environmental niches through tool manufacture, and increasing and strengthening their social groupings to maximize mutual support” (2000: 209).

Yet, at the same time, catastrophe has been unfolding for tens of thousands of years in human history. And now, in the face of far greater climate changes currently unfolding, humanity – advanced industrial nations more specifically -- remains collectively paralyzed and unable to adapt to its new realities, largely because of its addiction to growth and fossil fuels, the power of fossil fuel industries,

and the continuing influence of the modern concept of progress. The forms of resistance to global capitalism and fossil fuel industries one can find – e.g., the global direct action group Extinction Rebellion, the student strike movement, or climate justice groups -- lack mass support and sufficient force to precipitate substantive change.

History is replete with examples of the decline and fall of empires. Whether Mesopotamian, Mayan, Greek, or Roman, great societies have come into being and vanished into archaeological rubble and detritus. In addition to numerous social causes of crisis and collapse, decisive factors include overshooting ecological limits and degrading the environment-- through means such as overfarming, overgrazing, overhunting, deforestation, soil erosion, salinization, and starvation brought about through exhaustion of resources and ecosystems (Diamond 2011). Beginning in the mid-twentieth century, the industrial exploitation of animals for food consumption -- through factory farm systems of intensive confinement -- has been one of the leading (and most ignored) causes of a wide array of environmental crises. The mass production of animals for food is a key cause of desertification, rainforest and habitat destruction, resource depletion, species extinction, and global warming, to say nothing about the leading role meat consumption plays in human disease.<sup>22</sup>

But there is an even greater and more decadent empire than any single world power from the ancient or modern world. Here we are speaking of imperialism and world-colonizing nature of the Human Empire, the reign of *Homo sapiens*, the Imperial Species for which all living things and the earth as a whole are but resources to exploit for its own needs and satisfactions. The *Human Reich* over nature is inherently flawed, catastrophically overextended, and soon to fall on its own sword. In the decadent 21<sup>st</sup> century empire of *Homo sapiens*, where runaway climate change is already manifest in dramatic forms of glacier melting, drought, rising seas, superstorms, wildfires, and so on, the Human Empire seemingly stands at the precipice of collapse, with little time to turn its juggernaut around.

*The Holocene epoch of the last 12,000 years is over.* Humanity and all other species have entered a new epoch, one that by definition is named for the ubiquity and severity of our dramatic and unrivalled impact. The Anthropocene marks a break in geological time in which humans are now the major drivers of evolutionary change. From global forms of overhunting in the Late Pleistocene to the emergence of agricultural society at the dawn of the Holocene *Homo sapiens* has been transforming the world in increasingly dramatic fashion. As disruptive as human impacts were over the last fifty millennia, however, humans did not become a potential destabilizing *planetary* force of change until the 19th century, in the merger of capitalist systems and industrial technologies. Within a mere two centuries, the combined force of these economic and technological revolutions -- powered by the rapacious extraction of coal deposits and belching of greenhouse gases (carbon dioxide, methane, nitrous oxide) into the environment -- inexorably began to heat up the planet, destabilize earth systems, and precipitate a climate crisis now accelerating out of control.

First in 1992, then again in 2017, world scientists issued a “Warning to Humanity” (Ripple et. al. 2017). The 1992 report stated that “*humans were on a collision course with the natural world,*” urging the human race to consider the detrimental effects of a number of environmental issues, from marine life depletion and ocean dead zones to climate change (Union of Concerned Scientists 1992). According to 2017’s “Second Notice”, “humanity has failed to make sufficient progress in generally solving these foreseen environmental challenges, and alarmingly, most of them are getting far worse” (Ripple et. al. 2017). The report affirmed the notion that “we have unleashed a mass extinction event, the sixth in roughly 540 million years, wherein many current life forms could be annihilated or at least committed to extinction by the end of this century” (ibid.). In unequivocal terms, the scientific collective noted: “By failing to adequately limit population growth, reassess the role of an economy rooted in growth, reduce greenhouse gases, incentivize renewable energy, protect habitat, restore ecosystems, curb pollution, halt defaunation, and constrain invasive alien species, humanity is not

taking the urgent steps needed to safeguard our imperiled biosphere” (ibid). As noted above, in late July 2021, scientists have issued what must be considered as a third major warning.

For half a century the world has ignored the warnings of scientists on climate change and ecological breakdown, and now we are paying the price. The climate is changing much faster than we are, and time is rapidly running out. There are lessons to be learned from the failures and collapse of past societies about the consequences of overshooting ecosystems and unlimited growth. But modern civilizations don't learn or implement these lessons and continue to pursue irrational, denialist, and self-destructive paths. Elite economic and political interests are far more powerful than truth and facts, and the will of a more rational public is consistently ignored or suppressed. As well, modern humans remain captive to ancient ideologies of anthropocentrism and speciesism and pathological narratives first spawned in agricultural society. Humans continue to believe that they are a radically unique and privileged species, that nature and other animals are resources and commodities for their use, and that we have a manifest destiny to grow, continuously prosper, achieve ever greater levels of control over nature.

We need a new story about our nature as a species and our place in the world. As Eldredge writes, “We have to face the fact that the old stories that were accurate and viable 10,000 years ago have outlived their usefulness, now that our no-longer-novel agriculturally based strategy is beginning to raise serious problems for our own future.” (1997: 99). Although enlightened minds have spoken out against anthropocentrism, speciesism, and domineering lifeways throughout the history of western culture, and for decades sectors including science, philosophy, and even religion have urged radical new identities and paradigm shifts, the alienated humanist and growth-oriented mentalities and policies prevail.

The regnant anthropocentric stories humans have developed over the last two thousand years are false, limited, dysfunctional, and dangerous, wholly unsuited for the destructive power of an alienated and technologically advanced civilization. The modern metanarrative of inexhaustible needs, endless growth, and universal happiness has been exposed as the primitive lie it always was. Once stripped from the metaphysical wheels of fate, in comparison to modern progressivism and its linear narrative of history, one can recognize the ultimate truth and wisdom of the ancient cyclical view of history that all civilizations rise and fall, grow and die.

There is a desperate need for a new consciousness, for more universal and new cosmopolitan identities. Human beings must begin seeing themselves not as citizens of one nation or another, but of the earth, indeed, of the dynamic cosmic matrix itself. Homocentric dramas need to be superseded by cosmological narratives that situate human life in the larger evolutionary process of the universe. As Thomas Berry writes, “The story of the universe is the story of the emergence of a galactic system in which each new level of expression emerges through the urgency of self-transcendence” (2006: 132). Despite the possible religious or metaphysical overtones, this new story can be understood in strictly scientific terms of dynamic, evolving matter, leading to ever greater complexity of life.

The new cosmological narratives often seek to reconcile science and religion, using science to explore the physical nature of the universe while retaining religious sentiments as a source of meaning and reverence for life (re-ligare means “to re-connect”). Unlike the mechanistic science of the modern period which disenchanting the world, reduced nature to objects of manipulation, and estranged humanity from the process of life, the *postmodern science* developing in the last few decades is telling a new story (see Best and Kellner 2001). This narrative reintegrates humanity into the entire drama of evolution, and finds the higher apes in our DNA, the oceans in our blood, and the stars in our cells. It brings science into contact with ethics and values, which the dominant modern tradition eschews in the value-laden name of value-free “objectivity.” At stake is the creation of a scientifically accurate *and* life-



enriching new story that emphasizes the vital links among human beings, other species, the earth, and the entire universe.

In their compelling book, *The Universe Story*, historian Thomas Berry and mathematical cosmologist Brian Swimme construct an evolutionary epic story that ranges from the big bang and the creation of the earth to the emergence of life and development of human culture. On their view, all matter and life can be seen as the offshoots of differentiation (biodiversity), communion (cooperation and coevolution), and self-organization. While different cultures generate different cosmologies, Swimme and Berry believe that "there is eventually only one story, the story of the universe" (1994: 268). The idea that matter and life are self-organizing, complex systems provides cosmology with a key to reintegrate human beings into the universe. Self-organization cosmology overcomes the long-standing dualities in western thought between matter and spirit, nature and freedom, and human and nonhuman animals, and allows a theory of a highly complex universe without positing god or teleology. Where the Newtonian view radically separates human beings from the universe, leaving them alienated and forlorn beings amidst biological alterity and a dead material world, postmodern science seeks to make us, once again, "at home in the universe" (Kauffman 1996). If life, order, and structure are the natural state of the cosmos, then human existence can be grasped as created naturally by the world, rather than in opposition to it.

"The present disintegration of the life systems of the earth is so extensive," write Swimme and Berry, "that we might very well be bringing an end to the Cenozoic period that has provided the identity for the life processes of earth during the past sixty-seven million years" (XX). They lay out two main options for our problematic future. One path is to continue our tortured journey into a "technozoic era" that sees nature as resources for human exploitation and gradually dismantles all life-support systems. Another way takes us into a new "ecozoic era" that views the universe as a communion of subjects rather than a collection of objects; this road begins with reawakening consciousness to the "sacred" dimension of life, appreciating the limits of nature and the need for sustainable cultures.

While humanity is free to write our own social and ethical laws, we have yet to learn that we must conform to the laws of nature. These are the laws of ecological interdependence, balance, and limits that are inconsistent with our burgeoning population, insatiable appetites, carnivorous lifestyles, and ideology of limitless growth. "The core of [William Catton's theory of] Overshoot," writes John Michael Greer, "which is also the core of the entire world of appropriate technology and green alternatives ... is the recognition that the principles of ecology apply to industrial society just as much as they do to other communities of living things" (2015). The *new story* informs us that humanity survives and flourishes not by opposing itself to nature, as the old story has it, but rather by harmonizing with all that has come before it in the multi-billion-year odyssey of evolution.

The universal vision of history as one people such as developed by Stoics, Christianity, and some Enlightenment thinkers occluded vast cultural differences and dynamics and subsumed all peoples into a totalizing vision of history that ultimately succumbed to a racist Eurocentric tale. The universal narrative, nonetheless, captured the truth that the human adventure ultimately was one. Even more expansive, the new universal story proposed by Swimme and Berry involves solidarity and interconnectedness of all species and their profound interrelationships and interconnected fates.

It is a promising sign that science, which has done so much to falsify and eradicate our ties to life, is beginning to help rebuild vital connections through new holistic and ecological theories and growing more resistant to political propaganda and climate denialism. We truly are "in between stories," as Berry says, as we struggle to shed the dominator worldview in favor of an ecological narrative that emphasizes our responsibilities in the larger biocommunity that engulfs us, in which we are only one of millions of interdependent, coevolving species.

But it certainly is *not*, as Berry insists, "all a question of story." It is *also* a question of politics, of how we struggle against hierarchies and domination, and what alternative institutions we seek to put in their place, and how we can initiate the dual processes of *de-growth and re-wilding*. The future depends not only on the dismantling of global capitalism and hierarchical systems of any kind, but also on the emergence of a new sensibility that devolves around ecology, holistic systems thinking, animal liberation, and a new respect and reverence for life and our own delicate role in a fragile system. Instead of embarking on the current disastrous project of remaking nature through genetic engineering, we ought to be fostering the far more sane and profound goal of remaking ourselves, in a fashion that restores the connection between humanity and humility, economy and ecology, equality and democracy, and the principles of society and the laws of nature.

The future, is there is to be one for humans and countless other species, depends on the ability of people to unite, act collectively, and radically change their worldviews, values, and social structures. After millions of years of prehistory, and just two hundred thousand as *Homo sapiens*, we have reached a *pivotal point in history*, a crossroads for the future of life, such that we can choose either breakdown or breakthrough (see Korten 2006). In the language of scientific chaos theory language, there have been numerous bifurcation points of social disequilibrium in history when a fundamental system transformation could have occurred, but the new fluctuations did not provoke change in fundamental structure. We are a critical point of disequilibrium now, when new forms of resistance can and must arise.

The shift from an economic fetish to an ecological ethic requires a revolution in human consciousness, such as which Aldo Leopold hoped could emerge with a new "land ethic." While hopeful, Leopold had no illusions this process would unfold in the rapid and timely manner required by the current ecological crisis. In 1947, he wrote: "It took 19 centuries to define decent man-to-man conduct and the process is only half-done; it may take as long to evolve a code of decency for man-to-land conduct" (1991: 345-346). The looming question here, of course, is: *do we have the time?* Do we have another nineteen centuries, another nine centuries, or even another ninety years?

The main drama of our time is which road will we choose to travel into the future -- the road that leads, to peace and stability or the one that verges toward war and chaos. The one that establishes social justice or generates ever-greater forms of inequality and poverty? Will we stay on the same modern trail of irrational growth and development, of the further uncontrolled expansion of global capitalism, or will we stake out an alternative route, one that radicalizes the modern traditions of Enlightenment and democracy and is guided by the vision of a future that is just, egalitarian, participatory, ecological, healthy, happy, and sane? Will we move, in Korten's phrases, toward the "Great Unraveling" and plummet deeper into the unfolding crisis or will we embark on a "Great Turning" where we finally learn to live in partnership with one another, animals, and the Earth? Can *Homo sapiens* again change and adapt, as it did successfully so many times in its early evolutionary history, or will we crash and burn? And what will future generations say of us, of our generation living in the time of global warming, extinction crisis, biological meltdown, and ecological collapse. Will they look back in anger, contempt, and loathing at our blindness and apathy or will they extol those became fully awakened to the human social and conceptual crisis and moved with courage and conviction to overcome this evolutionary impasse?

### The Twilight of the Idols

*"As an evolutionary strategy, exploitation has had its day." Colin Tudge*

*"[T]he system is in no one's interest. It's a suicide machine." Ronald Wright (2005)*

The human species is driving itself full speed into an evolutionary dead-end. We are destroying the planet and everything we do murders animals and dismantles ecosystems. We have lost our moral compass. We think in terms of profit and power rather than ethics and compassion. We no longer have reverence for life or any sense of connection with the natural world. We see ourselves as conquerors of nature rather than citizens of a vast biocommunity. We are technologically sophisticated and morally stunted. We have no conception of the importance of nonhuman life forms in sustaining ecosystems and no sensitivity to the inherent value of species outside of our exploitative purposes. We fail to realize that what we do to animals and the earth, we do to ourselves. And all the while, we live in a fantasy land of entertainment and distractions whereby we focus more on the sex lives and surgical makeovers of movie stars than the most consequential changes unfolding in this planet in the last sixty-five million years.

Windows of opportunity are closing. We are likely to surpass the 1.5 Celsius threshold by 2030 and we have only years, not decades, to *dramatically change the course of history and global civilization*. At a time when international cooperative and unity on all fronts in the face of a global crisis engulfing everyone, we have seen (certainly in the Trump era and its aftermath), a rise in nationalism, nativism, racism, xenophobia, and pseudo-populism which is pulling nations apart and dividing them from within, as insipid conspiracies such as QAnon take hold of the disaffected seeking simple answers to complex problems. It is incredibly worrisome to realize that as the climate crisis grows stronger, the political will to fight it grows weaker. We remain entrapped in our dysfunctional worldviews, narratives, values, institutions, and addictions.

Here in the US, throughout the last two years, I have anxiously witnessed the troubling phenomenon of an advanced nation incapable of grappling with indisputable facts and realities. If most of one political party (Republicans) and the nation as a whole rejects the science behind COVID-19 and the overwhelming evidence supporting the safety of vaccines, how then can it ever come to grips with the far more complex and challenging problem of climate change? The mass denialism of the dangers of the COVID-19 virus – based on lies and ignorance promoted by Trump and right-wing media such as Fox News -- is a troubling indicator of the nation's inability to confront the far greater crisis of climate change, still routinely dismissed as a "hoax."

The actions that humanity now collectively takes -- or fails to take -- will determine whether our future, and that of biodiversity itself, is redeemable or bleak. In the aftermath of *ten millennia* of incessant growth and war waged upon other species and the earth, and in the presence of a global capitalism that is clearly reactionary and unsustainable, driving social and natural systems to irreversible tipping points of catastrophe, the greatest challenge in the history of our species is staring us right in the face: *How can we overcome our dominator mentalities, our alienation from the natural world, and our unsustainable social systems to harmonize our existence with the earth before it is all too little, and much too late? Can humanity dramatically change its entire mode of existence -- from their economic and political institutions to their cultures, traditions, worldviews, values, and ways of living and thinking -- to forestall the accelerating social and ecological global crises, or will we collectively and numbly continue to plummet toward disaster in the tailspin dive of denialism and inertia?*

Despite the technologically advanced nature of global capitalism, it is hardly immune from the problems that plagued societies in the past. Indeed, while sober theorists eschewing alarmism do not argue that we are doomed (certainly a counter-productive thesis), they often emphasize that social and ecological collapse on a global scale is a likely outcome *if* we continue to ignore portentous warning signs. As Thomas Malthus warned at the turn of the nineteenth century, Jared Diamond and others remind us, the ceaseless drive towards continual growth, prosperity, and "progress" is incompatible with the complex and integral dynamics of earth systems. While humans have *expanded* their independence from nature they have not, despite millennia of delusional fantasies, *transcended* nature

and the need to harmonize their social world with the natural world in which it remains inseparably embedded.

Environmental and biodiversity crises are at root *social* crises. They are caused by profound problems in the social world, by elites and the hierarchical control of decision-making and allocation of resources in profit-driven, expansionistic, ecocidal capitalist societies. As social *problems*, environmental crises require social *solutions*, namely radical political change seeking to create just, democratic, and sustainable societies. What we today call “natural disasters,” are at root *social* disasters that must be addressed if we are to solve the global climate emergency. We must not only transform our anthropocentric and speciesist identities, our arrogant and vainglorious forms of human supremacism and pathological alienation, we must also transform our growth-oriented, profit-driven, meat-based, fossil fuel addicted societies. For millennia, the western world above all has lived by the philosophy of humans first, even humans only. It is now time for a new philosophy of *earth first* whereby humanity begins the arduous process of de-growth -- radically reducing their population numbers and consumption levels, rewilding natural environments and reserving vast habitats for wildlife alone (see Wilson 2017), and shifting from a growth-oriented to a steady-state sustainable economy.

We're in an emergency situation that requires radical responses. For 70 years the world has ignored the warnings of scientists, and now we are paying the price. The climate is changing much faster than we are. We are losing a football field size of the Amazon rainforest every minute. We have years, not decades, to create net-zero societies, a short window of time for the formidable task of forging political alliances, international treaties, and mass resistance movements. This is no time for moderation or tepid reform measures.

The challenge before us is nearly as unimaginable as the consequences of not meeting it. Of course there are no guarantees that we as a species are up to this challenge, and thus we might fail and succumb to a nightmarish world of Hobbsean power struggles, social Darwinism, totalitarian capitalism, and climate apartheid amidst an earth in ruins. We have to face the possibility that whatever we may do may be too little, too late, and that catastrophic collapse of social and ecological systems could accelerate at shocking speed. In fact, climate change already is happening at an incredibly rapid rate. It is sobering to compare the magnitude of the threat posed to life on earth as we know it to our feeble response. It is imperative to grasp *both the magnitude of change needed, and the little time left to accomplish it*. We confront not the “death of the earth” – which will continue to evolve and mutate into new forms – but of biotic diversity and civilization as we know it.

Human evolution is not a given – neither in the naïve modernist sense that social life will increasingly improve over time through limitless prosperity, nor in the literal sense that it will continue at all. We are committing the same mistakes that doomed past civilizations, only on a much broader level, with more powerful technologies, more people, and with far greater consequences. We are on the verge of becoming a *failed species*, a species that has mishandled its intelligence and squandered its evolutionary potential, a species unable to recognize reality and adapt to change, a species -- as 19<sup>th</sup> century German philosopher Friedrich Nietzsche noted – is adept at denial and expert at self-deception. Under the spectral shadow of species extinction, runaway climate change, ecological collapse, resource scarcity, renewed nuclear threats, and escalating global conflicts, the future of human evolution is problematic at best and unlikely or doomed at worst. While the result is horrible to contemplate from *our* perspective, *Homo sapiens* may not have the will or intelligence to meet the unprecedented challenges of the Anthropocene and might thereby succumb to the same oblivion that engulfed its many hominid and *Homo* ancestors, and into which humans have dispatched countless thousands of other species.

But, considered from *the perspective of animals and the earth*, the demise of human beings could be the best imaginable event possible, as it would allow healing, restored balance, and a planetary regeneration that in time could bring about a new Cambrian explosion of biodiversity and amazing new species. Whereas worms, pollinators, dung beetles, and countless other species are vital to a flourishing planet, *Homo sapiens* is the one species – certainly the main species -- the earth could well do without. The earth and all its life forms are increasingly vulnerable to the mindless and generally malignant actions of one species.

Reminiscent of James Lovelock's concept of Gaia (2000), we can see the earth as a self-organizing, complex, and intricate system that strives toward balance – by any means necessary -- when disrupted. One way the earth achieves homeostasis is through extinction. Even though species vanish, the planet survives and regenerates – as the demise of dinosaurs sixty-five million years ago enabled a new ecological niche for the ascendancy and diversification of mammals. Species lose out, if necessary, to the larger dynamics of ecological balance. As Michael Boulter writes, “Extinctions are necessary to retain life on this planet ... extinction thrives on culling ... [I]f life on earth needs extinctions for it to change and diversify” (2002: 67, 170, 82). Humans not only are expendable in the overall calculus, their demise would be a positive event of enormous historical proportions that would no longer be measured by any advanced rational mind; if humans went extinct, Boulter writes, “peace and quiet would return” (ibid. 182). “If human behavior cannot evolve,” he notes, “[t]here will be no reprieve, no stopping of the progress of mass extinction, and man will surely be a victim within that. ... [o]ur power to do damage has grown to make our aggression terminal, not just dangerous” (ibid.). It seems that the largest genomes, the most complex physiology and neurology don't guarantee a permanent place on the throne of biodiversity. What we naively saw as an evolving hierarchy does not have ourselves, the human race, in its upper branches. The whole tree needs equal respect for all its parts” (ibid. 193).

To put it another way, if humanity as a collective whole cannot learn how to live properly as good citizens within the planetary biocommunity, it really has no right to live at all, for its existence is merely parasitic and destructive. As Wright emphasizes, *Homo sapiens* are experiments in evolution, indeed, singular “experimental creatures of our own making” -- intelligent, technological-driven, culture making, self-shaping apes. Without a sense of tragedy, perhaps wryly and tongue-in-cheek, he surmises that “[i]f we fail ... nature will merely shrug and conclude letting the apes run the laboratory was fun for a while but in the end a bad idea” (2005: 31). John Gray is even more blunt: “*Homo sapiens* is only one of very many species, and not obviously worth preserving. Later or sooner, it will become extinct. When it is gone the Earth will recover. Long after the last traces of the human animal have disappeared, many of the species it is bent on destroying will still be around, along with others that have yet to spring up. The earth will forget mankind. The play of life will go on” (Gray 2016 :151)

But unlike books such as Douglas Dixon's *After Man*, that envision prodigious speciation and renewal after the demise of *Homo sapiens*, theorists like Eldredge (and myself) believe that the human species might be around for a long time, but in one *degraded* form or another, competing for the last scraps of natural resources, and growing increasingly divided between those who can eke out a miserable existence and those who succumb and die. Yes, human life may continue on indefinitely, but most likely not in enviable form. Perhaps the primitivists were right, and the only path forward must come after the collapse of industrial civilization and a low-tech, minimal population rebuilding of hunter-gatherer lifeways. “After every mass extinction in the geological past,” Eldredge notes, “life rebounded... But that sort of recovery is simply not in the cards for today's ecosystems – not, that is, as long as *Homo sapiens* is around continuing its present course” (1997: 128). For Eldredge, “there is no dust settling” after the human meteor strike, it keeps hitting and hitting; we are “the irritant that does not go away” and so “evolution will not be trigger[ed?]. The long-term evolutionary restitution of the natural world must await our own demise”(ibid: 130).

Despite folklore phrasing, humans cannot “destroy the earth,” and it will carry on long after our demise. The earth has survived incessant cooling and heating periods, turbulent change, continents splitting apart and melding back together, and five mass extinctions before the one currently precipitated by humanity. And after each mass extinction the earth has regenerated and produced even greater levels of biodiversity than before (see Brannen 2017). As a middle-aged planet, the earth still has five billion years left to create thousands of new species before the sun explodes and obliterates every trace of pain and joy ever experienced here. Thus, the question is not will the earth survive, but rather will *we* survive, in what dismal forms, and how many species will we take down with us? Will we go out with a bang or a whimper, in sudden and catastrophic collapse, or in an agonizingly slow burnout amidst a post-apocalyptic landscape a la *Mad Max*, where scattered bands of warring survivors compete over the scraps of remaining resources and ultimately mass extinction is a preferable outcome?

There is no telos or destiny to which we will arrive in glory, however tardy, tattered, bruised, and blackened. There are no guiding angels to protect us from failure, no God to save us from total darkness, and no technofix (such as geoengineering) to avert climate change and restore equilibrium. But nor are there inexorable laws or wheels of fate that have pre-determined disaster and demise. We must change our course, and we can – if a critical mass of people throughout the world can understand the crisis and respond with the level of urgency, solidarity, and militancy necessary to move down the best path at this evolutionary crossroads.

As the corporate engines continue to slash and burn the planet, as inequalities widen and power grows, as human numbers and insatiable appetites continue to swell, as species exit this planet at accelerating rates, and as ecosystems begin to collapse, it is easy to become fatalistic and resigned to the catastrophe playing out on this planet, to the epic tragedy of the downfall brought on by humanistic hubris and insatiable levels of growth.

Christ Hedges (2017) says that we must accept the tragic reality of our situation but also find the courage to resist. “The inability to see what is in front of our eyes replicates the blindness of all past civilizations that celebrated their eternal glory at moments of precipitous decline. The difference is that life across the whole planet will go down this time. It is comforting to pretend this is not happening, to foster false hopes and fool ourselves with the myth of progress, but these illusions only tranquilize us at a moment when we should be rising in collective fury against those who are orchestrating our doom.”

We have no choice but to live in the twilight and tension of optimism and pessimism, hope and despair. As Italian theorist Antonio Gramsci wrote, “The challenge of modernity is to live without illusions and without becoming disillusioned.” Crisis situations always harbor opportunities for profound and progressive change; these openings are real and alive in the form of global resistance movements rising up and uniting against hierarchical domination on every possible level, but must grow greatly and quickly.

There is a whole new world and conceptual reality to construct. Progress is something human beings still can and must aspire to, and can achieve, but only with revolutionary changes in society, culture, politics, worldview, and human identity. A new moral compass, is desperately needed to guide and inform the radical institutional and conceptual changes necessary in this world. Progress can no longer entail the zero sum game of human “gain” at the expense of animals and the environment. Rather, a deeper concept of progress eliminates the opposition between human and nonhuman animals, between society and nature; it understands the profound interrelatedness of all aspects of our planetary ecology, and enables us to become good citizens of the biocommunity rather than Huns, barbarians, and invaders bringing down the whole house.

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## **Notes**

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<sup>1</sup> Many authors I cite use the metaphors of “plague,” “cancer,” “virus.” and so on to describe the rapid growth and expansion of the human species throughout space and time. While this discourse often carries misanthropic baggage that militates against the formidable and necessary task of building alliances among oppressed peoples to resist global domination, and typically conflates crucial differences among various classes, nations, and peoples in terms of asymmetrical impacts on the environment, I find that these metaphors nonetheless capture an important truth about the increasingly devastating impact of billions of people on biodiversity and ecosystems.

<sup>2</sup> The term “Anthropocene” was coined by American biologist Eugene Stoermer in the late 1980s. It first came to prominence in 2000, at a geological conference, when atmospheric chemist Paul Crutzen, growing exasperated with constant talk of the Holocene, and preoccupied with the extreme effects human activity was having on the planet, blurted out that the Holocene was over and we are living in a new epoch, the Anthropocene – the Age of Humans (see Hamilton 2017). However problematic or contested the concept of the “Anthropocene epoch” appears to some (e.g., see Moore 2019), it has become common coinage – as did once disputed “postmodern” discourse -- and will likely soon become the official scientific concept designating the latest epoch in earth history. Less awkward than many alternative coinages, the concept is important to mark a new epoch in earth history brought about by the long-growing disruptive effects of human activity -- industrial capitalism above all -- on the earth’s may interconnected systems.

<sup>3</sup> The useful concept of “progress trap” comes from Ronald Wright (2005). Wright argues that human societies enter a progress trap when they employ the same assumptions, values, and methods to extricate themselves from problems that they caused in the first place. Innovations in hunting technologies, for instance, were so



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“successful” that they led to species extinctions and lack of “food resources. Similarly, ancient Sumer perpetuated irrigation practices that were destroying soils and capitalist ideologies preach more economic growth as the solution to the problems created by economic growth. In these, and countless other cases, societies see the failures of their lifeways but are unable to reform.

<sup>4</sup> Anthropocentrism is the human-centered, exploitative view that the natural world is but resources for its use, and has a solely instrumental value, as mere means to its ends. I view speciesism as a subset of this cosmic predatory and narcissistic view, applied to nonhuman animals. On Peter Singer’s definition, speciesism is a discriminatory, hierarchical, and unjustified viewpoint analogous to racism and sexism: “Speciesism is a prejudice or attitude of bias in favor of the interests of one’s own species and against those of members of other species” (1990: 6), such that the sheer fact of one being a human animal rather than a nonhuman animal is sufficient to grant the former greater moral rights – and corresponding exploitative powers -- over the latter.

<sup>5</sup> Every human member of the *Homo* genus is a hominid, but not every hominid is a human. A “hominid” is an any upright-walking (bipedal) primate. According to Wood, “a hominin is the label we give to anatomically modern humans and all the extinct species on, or connected to, the modern human twig of the Tree of Life” (2005: 24).

<sup>6</sup> For a good overview of the Pleistocene overkill debate, see Nagaoka et.al. (2018).

<sup>7</sup> For arguments regarding early (pre-agricultural) forms of human violence, and the violent proclivities of human beings throughout history, see Keely (1977), Diamond (1992), Peterson and Wrangham (1997), and Smith (2009).

<sup>8</sup> The term “Neolithic revolution” so frequently used to characterize this shift misleads to the extent it obscures a process of gradual changes sweeping across the fertile crescent and other areas of the globe over the course of millennia (see Scott (2017). These changes, however, were decisive and mark the true beginning point of the human empire, as by ten thousand years ago, humans had developed utterly new forms of societies rooted in social hierarchies, the domestication of animals, and the manipulation of plants and the natural world.

<sup>9</sup> For critiques of the modern “metanarrative” of progress, see Best (2004) and (2014).

<sup>10</sup> The not infelicitous term “Homo sapiens” comes from John Grey (2016) and his misanthropic (but not entirely unjustified) view of humans as a predatory and invasive species.

<sup>11</sup> “World Population,” *Wikipedia* ([https://en.wikipedia.org/wiki/World\\_population](https://en.wikipedia.org/wiki/World_population)).

<sup>12</sup> “Frequently Asked Questions,” *World Population Balance* (<https://www.worldpopulationbalance.org/faq>).

<sup>13</sup> For critiques of the modern “metanarratives” of progress, see Best (2004) and (2014)

<sup>14</sup> These quotes are from the front page summary of the report (<https://www.worldwildlife.org/pages/living-planet-report-2018>); for the full report, see World Wildlife Fund (2018).

<sup>15</sup> “Compiled by 145 expert authors from 50 countries over the past three years, with inputs from another 310 contributing authors,” the IPBES says in its media release statement, “the Report assesses changes over the past five decades, providing a comprehensive picture of the relationship between economic development pathways and their impacts on nature. It also offers a range of possible scenarios for the coming decade” (IPBES: 2019a).

<sup>16</sup> As Earth Observatory notes: “A one-degree *global* change is significant because it takes a vast amount of heat to warm all the oceans, atmosphere, and land by that much. In the past, a one- to two-degree drop was all it took to plunge the Earth into the Little Ice Age. A five-degree drop was enough to bury a large part of North America under a towering mass of ice 20,000 years ago” (2020).

<sup>17</sup> On the history and scientific rationale behind the designation of 2 degrees Celsius as a critical benchmark, see Carbon Brief (2014).

<sup>18</sup> On the post-Paris Agreement global rise in emissions, see Harvey (2018) and Rice (2019).

<sup>19</sup> In November 2018, the United Nations released a special report on the “emissions gap,” or the worrisome discrepancy between where the world is to fulfill Paris climate targets and where the world needs to be. The report acknowledged that humanity has started to confront the problem of fossil fuel addiction, but it is not making sufficient progress to keep pace with accelerating climate change, warned again of the consequences of failing to make significant reductions in emissions, and suggested substantive changes to reduce emissions by 2030 and achieve net-zero by 2050 (see United Nations: 2018).

<sup>20</sup> Wells argues that alternative energy technologies and the so-called “green revolution” have had no discernible impact on climate emissions yet, but rather assimilate technologies such as solar power as add-ons to the fossil-fuel system, rather than replacements (2019: 178). Others are more optimistic that alternative energy technologies are rapidly developing and being implement.

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<sup>21</sup>As climate scientist Kevin Anderson adds, “We simply are not prepared to accept the revolutionary implications of our own findings, and even when we do we are reluctant to voice such thoughts openly” (2015). As the climate emergency worsens, however, there seems to be a counter-trend toward emphasizing the urgency of the problem.

<sup>22</sup> For two comprehensive reports on the catastrophic impact of meat production on a wide array of environmental, biodiversity, animal exploitation, social, and health issues, see the studies by the Food and Agriculture Organization of the United Nations (2006) and Greenpeace International (2018). Among the many superb books on the environmental impacts of global meat consumption, see Winders and Ransom (2019)