

Measures of Time: Exploring Debt, Imagination, and Real Nature

By JULIANNE LUTZ WARREN

“Without memory there is no debt,” writes Margaret Atwood in her 2008 book *Payback*—a series of lectures that explores debt as an imaginative construct. If the construct of debt requires memory, Atwood reasons, “debt [also] involves a plot line,” that is, a string of actions occurring over time, beginning with a handshake and heading toward a due date.¹ It is increasingly evident that the human economy is reversing some of Earth’s long-term trends. Modern conventional measures of a successful human economy have taken little account of the harmful consequences of such reversals. Many storytellers, however, have tried to incorporate nature’s realities into their understandings of what it means for a human economy to be truly profitable for the long-run. What might we learn, then, from such stories about the give and take between humans and Earth? Might they be helpful in re-conceiving notions about debt in ways that are mutually beneficial to all life?

DIVERGENCE

Beginnings—of Earth and of humanity—are a good place to start, to briefly trace what turn out to be their diverging stories of progress and measures of time and of debt.

Earth is a 4.5 billion year old planet. Earth’s life appeared about 3.5 billion years ago. Our species *Homo sapiens* has been around for only about 200,000 years.

Nature may seem to humans, looking backward from the point of our own existence, to move with infinite slowness. Across time—beyond what we can ever imagine—Earth’s geological foundations formed. With sunlight streaming down to warm the relatively cool, watered body of this globe, photosynthesizing life began mysteriously. Since then, Earth’s interdependent biological diversity, complexity, and fertility have increased, helping generate along the way a planetary atmosphere and climate conditions to which life is adapted.

Since at least the 1920s, Western ecologists have conceptualized nature as a multi-dimensional pyramid with layers from foundation to pinnacle connected by a circuitry of food energy flows.² In simplified form, on the bottom of the ecological pyramid are waters and soils created from bedrock and teeming underground life. Above ground are multitudes of photosynthesizers—the primary producers, making food from sunlight, water, and soil nutrients—everything from algae to sequoias. On top of the primary producers are numerous primary consumers—the herbivores, like deer or leafhopper insects. On top of the herbivores are a fewer number of secondary consumers—the carnivorous predators like sharks, wolves, and eagles. (Humans, as interdependent omnivores, naturally fall somewhere above the herbivores and below the top carnivores—alongside bears, raccoons, and squirrels). Nutrient atoms weathered from bedrock and captured from air by soil bacteria cycle upwards through such pyramids, which are filled with countless such intricately interconnected foodweb relation-

ships, and then are released back down to the soil or water—via defecation and death—to be taken up again by other life forms, and so on. The more biologically diverse a pyramid or, in other terms, an ecosystem is, the more likely it is for nutrient atoms to be recycled indefinitely and retained within it before being carried downhill via rain, wind, and gravity to rivers and eventually the bottom of the ocean.³ On balance, the gain of nutrient fertility taken up by life and cycling through ecosystems has tended to be greater than the loss over long ages. Similarly, over evolutionary time, more life forms have been created by natural selection than have gone extinct, for a net gain in diversity. Meanwhile, increasingly diverse and fertile interconnected pyramids of plants and animals exchanging carbon dioxide, oxygen, and other gases link bedrock to atmosphere, fostering a dynamic global equilibrium over the long term.

Over billions of years, Earth's nature has generated capacities for its own self-renewal. "Endless forms . . . have been and are being, evolved," in Charles Darwin's words. Functioning together, they have been collectively promoting what the twentieth century ecologist and conservation thinker Aldo Leopold termed nature's integrity, stability, and beauty—or in other words, its health.⁴ For those concerned with a broad range of life's values, vibrant health is a measure of ancient nature's perpetual progress.

It is difficult to say exactly when in the 200,000 year history of *Homo sapiens* our species embarked on a different trajectory of progress, forwarding the present world-dominating human economy—the way multitudes have come to manage feeding, clothing, sheltering, reproducing, and amusing themselves. The starting point might be the point at which we *Homo sapiens*, taking our first breath, realized we could expand our power on the world from mind to hand to tool. Or it might be when we began gathering in groups to plow soil and grow food. It might be when we considered ourselves "enlightened"—believing nature to be nothing more than physical matter for us to manipulate it

“Aided by scientific discoveries, modern society seeks by controlling nature to progress rapidly toward the lure of infinite wealth. Wealth has been not so much simply a destination, though, as an object of worship.

in order to improve our condition. Or perhaps it was when the “enlightened” brought their ambitions to improve the world to bear on a fresh new continent they named America, which was both a reality and a symbol of the riches of the good life many people longed for. Or it might be when our species numbers reached the one billion mark fewer than two hundred years ago, and unbridled capitalism combined with industrialism and a belief in Earth's inexhaustibility—physical and biological laws aside—further accelerated human population growth, which has required an increasing stock of resources from across the globe. The prodigious powers of technology and industry have helped the human population to burgeon to over 6.8 billion today.⁵ Whatever time we may take as our starting point, relative to the Earth's long history, *Homo sapiens* have developed their present massively complex, world-encompassing economy in an incredible flash.

Indeed, the swift pace of the rise and ongoing growth of humanity's current global economy defines it as much as anything and drives its expanding spatial scale. To measure its success, modern Western society—with Americans most recently leading the pack—has also established a different standard of progress than the health of the Earth. Our present economy, writes author and climate change activist Bill McKibben in his 2010 book, *Eaarth*, “is like a racehorse, fleet and showy. It is bred for speed. . . . The thoroughbred, like our economy, has been optimized for one thing only: pure burning swiftness. (Also, both are now mostly owned by sheikhs),” he adds.⁶ Aided by scientific discoveries, modern society seeks by controlling nature to progress rapidly toward the lure of infinite wealth. Wealth has been not so much simply a destination, though, as an object of worship. “There is no country in which so absolute homage is paid to wealth” as America, wrote nineteenth-century poet Ralph Waldo Emerson.⁷ Progress American-style has “no goal,” believed Massachusetts' governor Edward Everett back in 1840, “and there can be no pause; for art and science are, in themselves progressive and infinite. . . . Nothing can arrest them which does not plunge the entire order of society into barbarism.”⁸ This society invents ways to get its economic horse to circle the track faster and faster, without rest, churning nature into money and using that money to churn more nature into more money and so on. With the blessings of increasing wealth, its members believe, come freedom—freedom from insecurity, from fears

of hunger, hard labor, and poverty. More and more bushels of wheat, barrels of oil, bathtubs, iPods, SUVs, and rising GNPs have become not only the measure of economic progress, but even human success.

ACCOUNTING

It wasn't until 1878—a little more than a century after the American Declaration of Independence—that the United States government, now self-entitled proprietor of one of the world's most fertile regions, published its first *Official Statistical Yearbook* in order to keep track of the nation's economic progress. Until then, nature was so abundant on the vast North American continent that the new Americans had not found it necessary to keep accounts of their expenditures and production, let alone attend to the health of the Earth, which was vibrant indeed.

In fact, so easy was the American farmer's lot with "nature in her prime" in the late eighteenth-century, as Pennsylvanian farmer Richard Peters explained in a letter to British agricultural author Arthur Young, that there was no need for individuals to make "nice calculations" about profits.⁹ The land's wealth was there for the taking, and there was more than enough for everyone, so why bother with figures? Indeed, in 1792, George Washington humbly confessed his own share of ignorance when he could not answer "how many sheep an acre of woodland pasture would support."¹⁰ Likewise, Thomas Jefferson admitted that he had not thought of calculating "what were the profits of capital invested in Virginia agriculture." And almost a quarter of a century later America did not yet have "metallic measures of values" for land and no "stable index of real value."¹¹

Washington, more clearly than most, understood that such lack of land-use accounting may eventually have risky repercussions. Because land was so much cheaper than labor (especially because of slavery and indentured servitude), the nation's farmers, "if they can be so-called," he noted disparagingly, tended "not to make the most they can from the land . . . the consequence of which has been, much ground has been scratched over and none cultivated or improved as it ought to have been." Farmers tended to "cut down" and keep "a piece of land under constant cultivation," he explained, "until it will yield scarcely anything; a second piece is cleared and treated in the same manner; then a third and so on." Washington doubted that the "wretched"¹² land-use habits of Americans would

be conquered by anything "short of necessity."¹³ The easiest and most frequently chosen option for ongoing economic improvement was to substitute quantity of acres farmed for quality of farming, spreading the destruction of land and propelling migration westward.¹⁴ Already by the last decade of the eighteenth-century, the speed of expansion into the regions west of the Potomac River was "beyond conception," to Washington's mind. He could glimpse that a future in which the land would be filled up with people and scratched over with plows might be quickly approaching.¹⁵

It was difficult for many, though, to reconcile the reality of rapid land exhaustion with impressions of North America as a vast, practically inexhaustible continent. Thanks to that "powerful enchanter, Time," in the words of Charles Dickens, a future in which good land had run out appeared far distant, or at least could be pushed off into an unforeseeable age by buying up more space and inventing better methods of land management.¹⁶ Jefferson—the visionary principal author of America's *Declaration*, and the nation's third president—could see, as did Washington, that American agriculture was impoverishing land. In severe cases, he recognized, it would take a long course of years for recovery. Indeed, some of his own Virginia fields by the 1790s had been "completely exhausted by perpetual crops of Indian corn and wheat alternately."¹⁷ Yet Jefferson also believed that the country's original soil was so fertile that with better management it would exhaust only slowly, if ever. Better management would become more important as population increased until there was more labor than land, he understood. But in 1793, in his home state of Virginia, it was still cheaper to buy an acre of new land than to add manure to replace depleted fertility on an old one.¹⁸ And, thinking in terms of democratic economy, Jefferson implied that the problem of the still-distant future would be overproduction, not land depletion. Even before the Louisiana Purchase, he wrote that there were "now lands enough to employ an infinite number of people in their cultivation . . . our citizens will find employment in this [farming] line, till their numbers, and of course, their productions become too great for the demand, both internal and foreign. This is not the case as yet, and probably will not be for a considerable time."¹⁹

With far less thoughtfulness than Jefferson, the Pennsylvanian farmer Peters was at least as sanguine about America's landed future. Where people's families outgrew their properties or when they were simply

tired of their own farms, Americans could and did sell them and move to fresh land. A burgeoning population would, in fact, make land increasingly valuable on the market, Peters understood. Because of this he boasted to Young that if the latter were to sell his English farm and invest his capital in American territory, he could turn a 500 percent profit on it in ten years. And while Peters, too, could imagine that new land might eventually run out and old land be worn out, yet the end of easy, sure, and fast profit-making was, to his sight, “far distant.” In line with Washington’s observation that only necessity would bring landowners to better land use, Peters was content to leave to future generations “the toil, calculation, and expense of renovating lands exhausted by bad tillage.” When the need arises, Peters wrote, “the proprietors of old lands will adopt better systems of agriculture, which are now fast advancing.”²⁰ Who could really say, though, which would advance faster: exhausted lands or better farming methods?

Meanwhile, between the period of the earliest European settlement and the nineteenth century, among the most obvious changes in the American landscape were that millions of bison had vanished from the North American plains, while virtually all of the salmon were wiped out south of Maine. America had also lost almost half of its original forests and considerable amounts of once-fertile soil. In 1847, Vermont intellectual George Perkins Marsh pointed out that in his home state, “for want of foresight,” Americans had abused the forested hillsides. Stripped of trees, soils eroded into waterways and rains flooded them. Lush stream valleys were turning into “broad wastes of . . . of gravel and pebbles, [becoming] deserts in summer, and seas in autumn and spring.” And while it had taken centuries for ancient Roman civilization to devastate its landscape, he later argued, it had taken Americans mere decades.²¹ “The changes, which these causes have wrought in the physical geography of Vermont,” Marsh continued, “within a single generation, are too striking to have escaped the attention of any observing person, and every middle-aged man, who revisits his birth-place after a few years of absence, looks upon another landscape than that which formed the theatre of his youthful toils and pleasures.”²²

Marsh was one of the first to speak out on the matter of humanity’s debt to the land and to future generations who would require fertile places to live. In 1864, about forty years after Jefferson’s death, Marsh

published his major work, *Man and Nature*. In this book, Marsh argues that though humans are like all other forms of life in depending upon “the table of bounteous nature,” yet they are “a power of a higher order.” In fact, humans were distinguished from all other animal life, he wrote, by their tendency to unbalance nature by taking more of her provisions than they needed and more than they paid back. Man, he pointed out, “has too long forgotten that the earth was given to him for usufruct alone, not for consumption, still less for profligate waste.” With mounting evidence and personal insight, Marsh built his case that it was prudentially responsible and morally right to repay “to our great mother [Earth] the debt which the [swift-footed] prodigality and the thriftlessness of former generations have imposed upon their successors—thus fulfilling the command of religion and of practical wisdom, to use this world as not abusing it.”²³

A decade and a half later, however, the first U.S. *Statistical Yearbook* did not include a column for Marsh’s kind of morality. Its ledger included listings for finance, coinage, commerce, immigration, shipping, imports and exports, railroads, agricultural crops, and coal produced. There were no records for how many trees, fish, tons of minerals, or acre feet of

“The easiest and most frequently chosen option for ongoing economic improvement was to substitute quantity of acres farmed for quality of farming, spreading the destruction of land and propelling migration westward.

fresh water remained. There was no attempt to account for the native people expelled, soils eroded and exhausted, plant and animal species missing, or waters polluted. There was no tally of what had been not merely used, but wasted and consumed, compromising nature’s capacity for self-renewal.

Efforts to calculate America’s take of what was required for Earth’s ongoing health and how much of that capacity remained would come later, and with it, a rising understanding of how difficult such calculations were to make. The formalized concept of maximum sustained yield reaches back at least to German forester Georg Ludwig Hartig’s 1795 decree that “not more and not less may be taken an-

nually [from state forests] than is possible on the basis of good management.”²⁴ But this principle proved a battle ground for the different measures of short-term market demands versus the long-term realities of nature’s regenerative capacities.²⁵ On the one hand, it was more economically profitable to take all you could as fast as you could, turn it into money capital, and reinvest it to make more—even if it meant drawing on nature’s capital, its fertility and diversity. Nature’s long-term well-being didn’t count in these calculations of sustainability.²⁶ On the other hand, it was morally responsible to life on the planet and also to future generations of humans to limit the speed and quantities of take to nature’s interest, leaving its capacities resilient and productive for ages to come. This was the overriding concern of America’s first German-trained USDA/USFS Chief Forester, Gifford Pinchot. In view of a looming timber famine, he urged the Progressive Era conservation ideal of better managing natural resources for the maximum good for the maximum number of people for the long term.

The sustained yield concept was theoretically appealing to a range of twentieth-century scientists, policy-makers, managers, and economists. Calculating proper limits for sustained yields of particular so-called natural resources was, however, confounded by the vast complexities of interrelationships of nature. By the later 1930s, the well-known forester, father of wildlife management, and ecological conservationist Aldo Leopold realized that management for maximum yields of singled-out resources often ended up at cross-purposes. For example, a game manager might kill wolves believing that he was protecting deer for hunters while inadvertently creating a forest manager’s nightmare of burgeoning deer herds over-browsing vegetation that would take many years to regrow. Leopold turned his attention away from resource-by-resource management to a holistic ideal that incorporated nature’s interconnectedness. Ahead of his time, he came to understand that healthy nature was the only valuable nature in the long term, developing a new standard for good land use measured in terms of

Marsh was one of the first to speak out on the matter of humanity’s debt to the land and to future generations who would require fertile places to live.

nature’s health. A few decades later yet, fisheries biologist P. A. Larkin concluded in a 1977 review article that the whole sustained yield concept was dead and required an epitaph. He didn’t know what would take its place, but he was sure that optimizing sustainable yield of resources had no guaranteed outcome. It could be “a recipe for achieving heaven or hell,” in Larkin’s words, depending on where you stood or how fast you ran in relation to nature’s realities.²⁷

Continuing into the twenty-first century, however, the concept of maximum sustained yield has hardly gone away, though it has taken on a few new manifestations in a world where buying more space is largely no longer feasible, and intensifying management has taken on greater urgency. Nobel laureate Norman Borlaug, for example, father of the “Green Revolution” in agriculture, in the 1940s began promoting around the world a cropping system involving monocultures, irrigation, fertilizer and pesticide applications, new machine technologies, credit for farmers so they can pay for these inputs, and economic markets so they can sell their harvests. His goal was to help balance the land-food-population equation by maximizing yields of food. With rising hundreds of millions of people hungry, in 2000, on the thirtieth anniversary of his award, Borlaug implored agricultural researchers to improve “maximum genetic yield potential”—the capacity of cereal crops to produce as much seed as possible—in order to sustain a maximum global human population that continues to expand. “Imagine the benefits for mankind,” he pressed.²⁸

It is increasingly clear that this kind of accounting—which takes the satisfaction of humanity’s rapidly rising demands as its measure of progress while it largely disregards nature’s time-proven, health-generating processes—overlooks a rising indebtedness and impending due date. As humans hone methods of rapidly taking from nature more than they repay, it is easy to reimagine McKibben’s metaphor of the current world-spanning modern, sleek racehorse economy now running on a treadmill instead of a track. And as it does so, it turns a small, toothed gear in faster rotations against a larger, slower-cycling one. Wealth circles quickly forward, forcing nature’s momentum into accelerating reverse. Rather than increasing in biodiversity, the Earth is now losing species one thousand times faster than the planet’s historic rate:²⁹ Great Auk, Passenger Pigeon, Las Vegas Leopard Frog, and Sexton Mountain Mariposa Lily, to name a few.

Meanwhile, extinction debt—the sometimes centuries-long delayed death response of species to habitat fragmentation and loss—may raise numbers of unique life forms lost to time beyond what we have already observed or imagined. The human economy has also reversed the

ancient trends of building soil fertility. Recent studies confirm that agricultural soil erosion substantially outpaces soil production worldwide and is several to a thousand times greater than pre-agricultural rates. Upwards of a third of the world's potentially farmable land has been lost to erosion since the dawn of agriculture—much of that in the past forty years.³⁰

Biodiversity, fertility, and Earth's composition of atmospheric gases are mutually interdependent. In addition to the contribution of carbon dioxide to the atmosphere made by burning fossil fuels—the stored remains of ancient life—as much as one-third of the total greenhouse gas buildup in Earth's atmosphere since the nineteenth century has come from cutting down trees and plowing up hundreds of millions of acres of soils, exposing fresh and long-buried organic matter to air and oxidation while at the same time diminishing ecosystem's capacities to renew their own fertility and biodiversity.³¹ Present-day concentrations of carbon dioxide are higher than any that have been observed in the past 800,000 years.³² This rapid, unprecedented change has contributed to a degree rise (Celsius) in average global temperatures since 1850 and to the destabilization of the planet's climate. This in turn has led to acidifying oceans, rising sea levels, shrinking glaciers, intensifying storms, increasingly frequent droughts and floods, changes in the timing of seasons, out-of-synch predator-prey relationships, further losses in biodiversity, and human suffering—e.g., from destruction of homes, contracting food and water supplies, and increasing disease outbreaks. Current projections are for temperatures to rise another 2.5–4.7 degrees by 2100.³³

Moreover, the racehorse economy has had inequitable consequences for peoples of the world. While the United States, for example, has produced nearly a quarter of the world's total greenhouse gases, it has ignored its responsibility for doing so, rejecting

“It is increasingly clear that [the] kind of accounting—which takes the satisfaction of humanity's rapidly rising demands as its measure of progress while it largely disregards nature's time-proven, health-generating processes—overlooks a rising indebtedness and impending due date.

plans to cooperate globally to cut emissions as its contributions still rise.³⁴ Meanwhile, those living in poverty and inhabitants of the poles, small oceanic islands, and southern nations—who contribute far less to the problem—have been among the first to suffer the consequences of

climate change. These peoples additionally have been left without the option to use the Earth as the expanding economy of the West has done. As their familiar environments have been transformed by the actions of others in distant places, they have become creditors in what has been termed ecological debt.

In sum, the capacity of Earth to renew itself and support life has been swiftly altered and impoverished by the urgent and rising demands of the predominating human economy. The accumulation of economic wealth for the good of some has globally outpaced nature's capacities to renew its own health for the good of all.

THE WITNESSES

These developments have not gone unnoticed. The Earth, if perhaps relatively long-suffering, bears an indiscriminate witness to human responsibility for ecological debt. Bearing witness, too, are a line of justice-minded storytellers—part of Western civilization's conscience—offering to help its members remember that they know they should be acting better. Stories, as Czech author Milan Kundera observes, help us to examine what has been in us for a long time and what possibilities remain within us as beings in the world, and thus, for the world. There are many voices from among whom to choose.³⁵ I have selected a handful who seem to know in their souls not only about the material imprudence of using short-term wealth as a measure of good life, but also about the immorality of neglecting the fuller, fairer measure of nature's enduring health.

Retribution Has the Fastest Horse

In Washington Irving's 1824 “The Devil and Tom Walker,” Tom became wealthy by making a deal with the Devil and agreeing to make more money by abusing broke, land-ravaging speculators. Legend has it that Tom, in a moment of panicky remembrance of his

own growing debt, buried his new horse upside down—one of the fine animals that pulled his fancy carriage with un-oiled wheels squealing like the souls of the debtors he was squeezing. Tom figured that when the Devil came to collect on Tom's own debt, sometime in the still-distant future, the world would be turned upside down and his horse would thus be ready for quick mounting. This was a superfluous precaution. For one day—as Tom was in the midst of a usurious transaction—three knocks came on his door. There waiting stood a black man holding a black horse, who whisked him into the saddle, the “steed striking fire out of the pavement at every bound.” In the Biblical book of Revelation, the black horse is the one that bears the scales. Indeed, members of a society in which one of its self-proclaimed religious leaders can laugh publically at the realities of global climate change, exclaiming, “I don't believe a moment of it. The whole thing is created to destroy America's free enterprise system and our economic stability,” might do well, as Marsh urged almost one hundred and fifty years ago, to re-consider its priorities and hubris in light of what its own true faith has always demanded.³⁶

We Should Beware of Lightning Fast Carriages

Charles Dickens was a big fan of Irving's, and, like him, mingled insights about debt, nature, and the economy with significance resonant on both sides of the Atlantic. In his 1859 novel *A Tale of Two Cities*, set in late eighteenth-century France and England, Madame Defarge slowly and patiently knits the names of the wealthy who obtained their luxuries by taking from others and from the land itself what was necessary for life and its regeneration. Nothing less than the blood of these rich debtors will be required as repayment by those left poor, in whom the desires for good lives still madly burn. Madame Defarge asks her husband, who is impatient for the inevitable vengeance to strike, “How long does it take to make and store the lightning? Tell me.”³⁷ A long time, we might thoughtfully suppose, as did Monsieur, a long time in the making. But when it does strike, it does so in an instant and is beyond our ability to predict.

Madame Defarge's slow knitting, with its mortal implications, has parallels today in the natural world in actual, not metaphorical, lightning. “We are in the mega-fire era,” says Ken Frederick, a spokesman for the U.S. federal government, referring to the climate-change induced consequence of larger storms over land now creating more lightning-initiated blazes.³⁸

And, indeed, unhurried as Earth's processes may seem when compared with the human economy, nature's changes may happen in what seems like a flash. A lightning bolt helps make molecular nitrogen in the air available to plants, feeding them and contributing to the long-term fertility-building and diversity of their ecosystem, but it may also sear an oak tree, start a blazing fire, and turn a forest and its inhabitants into ashes overnight.

In another scene in *A Tale of Two Cities*, a wealthy marquis in a wildly fast carriage drawn by four strong horses runs over a poor man's child—the wheels come to a “sickening little jolt.” In response, the marquis tosses a coin out the window to the child's grieving father, intending to pay off in this way his debt of life. The father secrets himself under the carriage, riding amidst the dust clouds of the churning wheels. The carriage slowly passes up a long hill through a landscape as bony and withered as the country people, enduring starvation, and then to the green of the marquis's luxurious stone estate. In the black of night, the father murders the marquis, turning his soft pillow red. Thousands more like him would be dead within a few years. Riders in fast coaches, because of what they could offer to pay in coin for Earth's treasures, were condemned for incurring inappropriate debts, and then denounced, and beheaded.

We Should Beware of Fast, Horseless Carriages

It is Dickens's old, familiar, truthful works that quiet the startled mind of Mr. Julian West in Edward Bellamy's 1888 *Looking Backward*, as he sits in his hosts' library trying to get a hold on himself. The privileged traveler Mr. West has discovered himself awakening suddenly out of the class injustices of 1887 Boston and into the same city, now characterized by perfect equity a mere 113 years later, in the year 2000. Imagine society of 1887, the narrator suggests, as a “prodigious coach” on which ride only the relatively few wealthy. The coach is pulled not by horses, but by the starving masses, driven by hunger. In the imagined society of 2000, however, everyone takes turns pulling, and everyone takes turns riding. People's wants have become, amazingly, not a debit, but a credit, helping promote an economy that sustains and builds up the Earth so that it produces more wealth with an efficiency that makes it possible to meet everyone's desires and to eliminate all fears bred of insecurity. The machinery of the national, globalizing economy in this story is like a “gigantic mill,” we learn, “into the

hopper of which goods are being constantly poured by the train-load and shipload, to issue at the other end in packages of pounds and ounces, yards and inches, pints and gallons.”³⁹

This imagined world may be remarkably egalitarian in terms of meeting people’s material demands, but independent nature is ended by human control.⁴⁰ Whatever has been wild and unpredictable—that perpetual play of forces that kept a diversity of life, in complex equilibrium, humming—has been brought into ultimate submission, conscribed to run its perpetual paces round and round the economic track, fueled by belief in human ingenuity.⁴¹ Yet Bellamy’s older contemporary, the naturalist John Burroughs, recognized that it was the long ages of the give-and-take of nature’s forces that kept the world alive. “Nature does not balance her books in a day or in ten thousand days,” Burroughs writes, “but some sort of balance is kept in the course of ages, else life would not be here. Disruption and decay bring about their opposites. Conflicting forces get adjusted and peace reigns. If all forces found the equilibrium to which they tend, we should have a dead world—a dead level of lifeless forces. But the play of forces is so complex, the factors that enter into our weather system even, are so many and so subtle and far-reaching, that we experience but little monotony. There is a perpetual see-saw everywhere, and this means life and motion.”⁴² As Leopold would put it later in the next century, “too much safety seems to yield only danger in the long run. Perhaps this is behind Thoreau’s dictum: In wildness is the salvation of the world.”⁴³

One person’s utopia can be another’s nightmare—indeed a whole world’s nightmare. We know with increasing certainty today that humans are not smart enough to manipulate nature to maximize benefits for themselves for the long term. Moreover, controlling nature’s wildness seems to go hand-in-hand with subjugating human liberty. In *Looking Backward*, for instance, Dr. Leete, Mr. West’s twenty-first-century guide, unwittingly compares the humans laboring in this imagined economy to a “disciplined army” under the one head of money capital as “under one general—such a fighting machine, for example, Bellamy wrote, as the German army in the time of Von Moltke.”⁴⁴ As Lewis Mumford recognized in his 1922 *The Story of Utopias*, Bellamy’s imagined world already was all too real.⁴⁵

There Is Wisdom in Walking

According to literary scholars, since at least the later part of the twentieth century—parallel with rising detrimental effects of human economy on nature’s health—there has been a decline in the quality and quantity of Western utopian literary works, and an upsurge in dystopic visions.⁴⁶ Their authors—and readers—are not sure if perhaps a consequence of destroying so much of our own species’ habitat might not require our own extinction to pay our debt to nature. We don’t know how long we might have to try to make amends, or whether it is even worth making the effort. In these dark stories are signs, though, that the deeper, intuitive parts of us still have not have entirely forgotten, after all, the truth of where our breakfasts come from, or that measuring goodness with money and not abundant, healthy life is not only imprudent, but morally untenable.

One of these dark stories seeded with conscience’s light is told in the ashen landscape of Cormac McCarthy’s *The Road*. The human economy and Earth’s capacities for self-renewal have been leveled by a fiery disaster. They now walk together at the same slow pace. There are no carriages, no racehorses, no plants, no animals—nothing growing at all that we can per-

ceive. A tattered remnant of humanity turns cannibal. A smaller fragment still struggles to cling to virtue and to resurrect memories of its past—colors, the names of birds, things to eat—that are quickly fading, as is its future. These answer the urge to live, and to live decently, even in the worst of times by delving into earthen cellars for the remains of stored foods, in an economy of absence.

Perhaps among the most important things of all that are being lost in the bargain between the human economy and Earth’s health is the “wisdom of slowness” and its “pleasures” ...

The heart of the story is told in spare conversation between a father and son on a journey downhill toward the ocean, where all life eventually finds its end, and its beginning. A few simple and slow pleasures remain—a sip of water, a surviving can of peaches—but what has been gained, in the end, is the wisdom of slowness.⁴⁷ “No list of things to be done,” thinks the father to himself as he lay in the dark, resting in the

hours between days of walking. “The day providential to itself. The hour. There is no Later. This is later. All things of grace and beauty such that one holds them to one’s heart have a common provenance in pain. Their birth in grief and ashes. So, he whispered to the sleeping boy, I have you.”⁴⁸

On Earth there remains bedrock, water, wind, and fire. “The fire,” asks the little

boy: “Is it real?” His dying papa answers, yes: “It’s inside you,” he says, “It always was there. I can see it.” A short time later, goodness in the form of a motherly woman finds the boy, now orphaned, and she talks to him sometimes about God. The boy tried to talk to God, “but the best thing was to talk to his father,” the boy thought, “and he did talk to him and he didn’t forget. The woman said that was all right. She said that the breath of God was his breath yet though it pass from man to man through all of time.”⁴⁹

McCarthy’s story is a grave reminder. Perhaps among the most important things of all that are being lost in the bargain between the human economy and Earth’s health is the “wisdom of slowness” and its “pleasures,” in the words of Czech novelist Milan Kundera.⁵⁰ In the haste of the modern human economy we are losing the greater meaning of nature, in Thoreau’s sense—the sense in which walking on footpaths through grasslands and forests recalls to us the reality that the smallest unit of health is that of the community of nature, of which we are interdependent members with all of Earth’s life. In subduing wild nature in a rush, trusting to the mighty steed of our economy, we are also losing our memory of nature as it was before we changed it. “It might be wise,” wrote Leopold ironically in the 1940s, to prohibit at once all teaching of real botany and real history, lest some future citizen suffer qualms about the floristic price of his good life.”⁵¹ Without memory—without witnesses—there is no debt, no story, no imagination, and no fresh possibility.

RE-PACING

It may be, concludes McKibben in his 2006 edition of *The End of Nature*, that the key environmental fact of our time is “the contrast between the pace at which the physical world is changing and the pace at which human society is reacting” to the consequences of those changes.⁵² We might also say that the contrast between the pace at which we have been changing the world and the pace at which nature is responding is a

vital factor in shaping future world conditions. Much may be regained by putting the economic horse out to pasture—give it a rest. Much may be regained, on balance, for life, paradoxically, by slowing down the global economy as quickly as possible—slowing down human reproduction rates, slowing down the time it takes to craft a product and the time between possessing it and throwing it away, slowing down the ways we gather food, slowing down the time it takes to cook and to eat food, slowing down to a walk on a path through the woods and the fields or from our homes to our offices, places of worship, parks, and pubs. Walk more. See more. Save more. Buy less. Shrink our overbearing, consumer-driven economy’s presence on Earth. For like Lewis Carroll’s Alice, when the magic cake wears off, we too have discovered that growing fast also makes us dangerously big—so big that we tip things over and are forced to leave Wonderland. In slowing down, society’s members may regain much by spending freed time in humbly remembering that wide range of deep-seated, very old human values that—given that lightning doesn’t strike quite yet—may carry us beyond the worship of short-term wealth to embrace the possibility of vibrant, dynamic, long-term health of Earth and our own species. Imagine the truth. Ask for forgiveness. Hope for mercy. For, if we can’t pay off our debt, at least we can die trying. We have it in us.

Julianne Lutz Warren, Ph.D. teaches environmental studies at New York University in the Liberal studies Program and environmental studies Program. she is author of *Aldo Leopold’s Odyssey* (Washington, D.C.: Island Press/Shearwater Books, 2006 under the former surname “Newton”).

This article will be published in a volume of collected essays on debt from the Center for 21st Century Studies forthcoming from Indiana University Press.

NOTES

1. M. Atwood, *Payback* (Toronto, ON, Canada: Anansi Press, 2008), 81.
2. C. Elton, *Animal Ecology* (Chicago, IL: University of Chicago Press, 2001). First published in 1927, Elton introduced his “pyramid of numbers.” Nature may be conceived as a pyramid based on body size and food relationships, as well as energy losses in transfers from lower to higher trophic levels. Elton writes: “the animals at the base of a food-chain are relatively abundant, while those at the end are relatively few in numbers, and there is a progressive decrease in between the two extremes” (p. 69). The small animals closer to the base tend to reproduce very quickly and become numerous and those higher up, which eat those lower down, tend to be larger and slower at reproducing and thus fewer in number.
3. Based on Aldo Leopold’s essay, “Odyssey,” in *A Sand County Almanac* (New York: Oxford University Press, 1987), 104-7. *A Sand County Almanac* was first published in 1949. Leopold drew on the work of animal ecologist Charles Elton (see endnote 2).
4. C. Darwin, *On the Origin of Species* (London: London Folio Society, 2006), 388; Leopold, *A Sand County Almanac*, 221-25.
5. S. Stoll, *The Great Delusion* (New York: Hill and Wang, 2008). Stoll discusses the history of economics in relation to the history of physics, noting that: “[nineteenth-century] Economists seized upon physics without understanding the full implication of the categories they clumsily translated into human action” (p. 145). And it has become increasingly clear that at some point it is not tools for mining “natural capital”—like certain fish, for example—that are the limiting factor in take, as Adam Smith might have it, but how many fish there are remaining to catch, if any (p. 155).
6. B. McKibben, *Eaarth* (New York: Times Books, 2010), 103.
7. R.W. Emerson, *The Complete Essays and Other Writings of Ralph Waldo Emerson* (New York: The Modern Library, 1950) 604.
8. As quoted in Stoll, *The Great Delusion*, 19.
9. See Notes by Richard Peters on Arthur Young’s correspondence, January 15, 1793. In F. Knight, ed., *Washington’s Agricultural Correspondence: To Arthur Young, Esq. F.R.S. and Sir John Sinclair, Bart, M.P. with Statistical Tables and Remarks by Thomas Jefferson, Richard Peters, and Other Gentlemen on the Economy and Management of Farms in the U.S.* (Washington, DC: Franklin Knight, 1847), 104. Peters is responding to Young’s questions about whether American farmers could carry on without calculating profit by percent on capital.
10. Letter from George Washington to Arthur Young, from Philadelphia, June 18, 1792. In Knight, *Washington’s Agricultural Correspondence*, 64.
11. Thomas Jefferson to Jean Batiste Say, Monticello, March 2, 1815, in E.E. Edwards, *Washington, Jefferson, Lincoln, and Agriculture* (Washington, DC: U.S. Bureau of Agricultural Economics, 1937), 69.
12. George Washington to W. Strickland from Mt. Vernon, July 15, 1797, in Edwards, *Washington, Jefferson, Lincoln, and Agriculture*, 32.
13. George Washington to Arthur Young, from Philadelphia, December 5, 1791, in Knight, *Washington’s Agricultural Correspondence*, 32.
14. Letter from George Washington to Arthur Young, from Philadelphia, June 18, 1792, in Knight, *Washington’s Agricultural Correspondence*, 63; letter from George Washington to W. Strickland from Mount Vernon, July 15, 1797, in Edwards, *Washington, Jefferson, Lincoln, and Agriculture*, 32.
15. George Washington to Arthur Young, from Philadelphia, December 5, 1791, in Knight, *Washington’s Agricultural Correspondence*, 29, 32.
16. C. Dickens, *A Tale of Two Cities* (Chicago, IL: Scott, Foresman and Company: 1906), 506.
17. Thomas Jefferson to unknown correspondent, Philadelphia, March 23, 1798, in Edwards, *Washington, Jefferson, Lincoln, and Agriculture*, 62.
18. Thomas Jefferson to George Washington, Philadelphia, June 28, 1793, in Knight, *Washington’s Agricultural Correspondence*, 102.
19. Thomas Jefferson to John Jay from Paris, August 23, 1785, in Edwards, *Washington, Jefferson, Lincoln and Agriculture*, 49.
20. Notes of Richard Peters on Arthur Young, January 15, 1793, in Knight, *Washington’s Agricultural Correspondence*, 108.
21. G.P. Marsh, *Man and Nature; or, Physical Geography as Modified by Human Action* (New York: Charles Scribner, 1864), 1-8.
22. G.P. Marsh, “Address Delivered Before the Agricultural Society of Rutland County, September 30, 1847,” Library of Congress, American Memory, at [http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field\(DOCID+@lit\(amrvgy20div1\)\)](http://memory.loc.gov/cgi-bin/query/r?ammem/consrv:@field(DOCID+@lit(amrvgy20div1))), 17-18, accessed April 2010.
23. Marsh, *Man and Nature*, iii, 8, 35-37.
24. H. Rubner, “Sustained-Yield Forestry in Europe and Its Crisis during the Era of Nazi Dictatorship,” in *History of Sustained-Yield Forestry: A Symposium; Western Forestry Center, Portland, Oregon, October 18-19, 1983*, ed. H.K. Steen (Santa Cruz, CA: Forest History Society, 1984), 171.
25. J. Newton, *Aldo Leopold’s Odyssey* (Washington, D.C.: Shearwater Books/Island Press, 2006), 293-94.
26. For a fuller discussion of the concept of sustainability in relation to land health see J.L. Newton and E.T. Freyfogle, “Sustainability: A Dissent,” *Journal of Conservation Biology* 19, no. 1 (2005): 23-31.
27. P.A. Larkin. “An Epitaph for the Concept of Maximum Sustained Yield,” *Transactions of the American Fisheries Society* 106, no. 1 (1977): 1-10.
28. N. Borlaug, “The Green Revolution Revisited and the Road Ahead,” Special Thirtieth Anniversary Lecture, The Norwegian Nobel Institute, Oslo, September 8, 2000.
29. E.O. Wilson et al., “Insights: Human Activities Cause of Current Extinction Crisis,” *Environment News Service*, May 19, 2005, at <http://www.natureserve.org/index.jsp>.
30. D. Montgomery, “Is Agriculture Eroding Civilization’s Foundation?” *GSA Today* 117, no. 10 (October 2007): 4-9.
31. Montgomery writes in “Is Agriculture Eroding Civilization’s Foundation?”: “A third of the total carbon dioxide build up in the atmosphere since the Industrial Revolution has come from degrading soil organic matter as hundreds of millions of acres of virgin land were plowed up in the late 19th and early 20th centuries.” According to the Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, R.K. Pachauri and A. Reisinger, eds. (Geneva, Switzerland: IPCC, 2007), forestry contributed about 17.4 percent and agriculture 13.5 percent of the 2004 global anthropogenic greenhouse gas emissions (36, figure 2.1). Global carbon dioxide emissions are primarily from fossil fuel; methane emissions come predominantly from agriculture and fossil fuel use. N₂O emissions are primarily due to agriculture (p. 37).
32. J. Pethica et al., *Climate Change: A Summary of the Science*, (London: The Royal Society, September 2010), 6. Available at: http://royalsociety.org/Report_WF.aspx?pageid=4294972964&terms=climate+change%3a+the+state+of+the+science&fragment=&SearchType=&terms=climate%20change:%20the%20state%20of%20the%20science
33. *Ibid.*, 5, 9.
34. E. Kolbert, *Field Notes from a Catastrophe* (New York: Bloomsbury, 2006), 148, 159.
35. M. Kundera, *The Art of the Novel* (New York: Grove Press, 1986), 115-116
36. The quote is of the late Jerry Falwell, cited in McKibben, *Eaarth*, 12.
37. Dickens, *A Tale of Two Cities*, 264.
38. McKibben, *Eaarth*, 3.
39. See chapter 17 in E. Bellamy, *Looking Backward: 2000–1887* (New York: The Modern Library, 1942).
40. B. McKibben, *The End of Nature* (New York: Random House, 2006).
41. L. Mumford. *The Story of Utopias* (New York: Boni and Liveright, 1922), 167. Hayden White, in “The Future of Utopia in History,” *Historiein*, vol. 7, 2007: 11-19 cites Benjamin: “The catastrophe would be if things stayed the same.” (p. 14).
42. J. Burroughs, “Hit-and-Miss Method of Nature,” in *Summit of the Years* (New York: William H. Wise, 1924), p. 86.
43. Leopold, *A Sand County Almanac*, 133.
44. See chapter 22, Bellamy, *Looking Backward*.
45. Mumford, *The Story of Utopias*, 167.
46. J. Rösen, “History and Utopia,” *Historiein*, vol. 7, 2007: 5-10; F. Manuel and F. Manuel, *Utopian Thought in the Western World* (Cambridge, MA: Harvard University Press, 1979).
47. See M. Kundera, *Slowness* (New York: Harper Perennial, 1995).
48. C. McCarthy, *The Road*, (New York: Alfred A. Knopf, 2006), 54.
49. McCarthy, *The Road*, 286.
50. Kundera, *Slowness*, 3, 36.
51. Leopold, *A Sand County Almanac*, 46..
52. McKibben, *The End of Nature*, xv.