

Immoderate Greatness: Why Civilizations Fail

By William Ophuls, 2012

(He also wrote *Ecology and the Politics of Scarcity*, which I read in college in the late 1970s in an environmental studies class.)

Selected excerpts

Preface

Most of the trends I identify are inexorable, and complex adaptive systems are ultimately unmanageable...a genuine cure would require a revolution in human thought greater than the one that created the modern world. (ii)

Introduction: Immoderate Greatness

There is simply no escape from our all-too-human nature. In the end, mastering the historical process would require human beings to master themselves, something we are very far from achieving. (1)

In essence, immoderate greatness exemplifies what the ancient Greeks would have called hubris: “overbearing pride or presumption.” Civilization is *Homo sapiens*’s bold attempt to rise above the natural state in which the species lived for almost all of its two hundred thousand years on Earth. Unfortunately, by its very nature, this effort to become greater encounters four implacable biophysical limits. It also sets in motion a seemingly inexorable moral and practical progression from original vigor and virtue to terminal lethargy and decadence...Like a tragic hero, **a civilization comes to a ruinous end due to intrinsic flaws that are the shadow side of its very virtues. (2)**

...the observable rhythms and structures of human history have demonstrable causes. (2)

Most historians have tended to emphasize the psychological factors as causal...But we shall see that biophysical constraints play an equally important, if not decisive, role in propelling civilizations toward exhaustion and eventual death. (3)

Because civilization is not natural, sustaining it entails a continuous input of matter, energy, and morale without which it would necessarily decline or even collapse. (3)

“All that is human must retrograde if it do not advance.” (Edward Gibbon, *The History of the Decline and Fall of the Roman Empire*) Thus the end of progress is necessarily the beginning of decline. (3)

Chapter 1: Ecological Exhaustion

“A bull contents himself with one meadow, and one forest is enough for a thousand elephants; but the little body of a man devours more than all other living creatures.” – Seneca (7)

“Forests precede civilizations...deserts follow them.” Francois-Rene de Chateaubriand (7)

A city is an ecological parasite...parasites debilitate or even destroy their host, so the outcome of this one-way, one-sided process is bound to be damaging in the longer term. (7)

...a city lives by consuming and damaging a wide array of ecological resource. (8)

...Rome left a legacy of denuded landscapes where forests once flourished or lions once roamed, and even its surviving croplands were degraded. (8)

...it is in the nature of civilizations to wax greater. In a positive feedback loop. The ready availability of virgin resources generates a larger, wealthier population that consumes more; increased demand then spurs further resource development, and so on. Thus, little by little, renewable flow resources like forests and fisheries are overexploited, and nonrenewable stock resources like minerals are drawn down. (8)

In pursuing greatness, human beings are simply expressing their biological nature. Biological evolution is driven by the tendency of all organisms to expand their habitat and exploit the available resources – just as bacteria in a Petri dish grow until they have consumed all the nutrients and then die in a toxic soup of their own waste. (9)

As a process, civilization resembles a long-running economic bubble. Civilizations convert found (or conquered) ecological wealth into economic goods and population growth. As the bubble expands, a spirit of “irrational exuberance” reigns. **Few take thought for the morrow or consider that they are borrowing from posterity.** (9)

The civilization begins to implode, in either a slow and measured decline or a more rapid and chaotic collapse. (9)

At some point service on the accumulated debt begins to preclude new investment, as more and more energy has to be expended simply running in place. (10)

In short, **on a finite planet you cannot grow forever or violate the laws of physics.** If you use renewable resources faster than they can regenerate, they will dwindle and ultimately disappear; if you produce wastes faster than they can be rendered harmless, they will poison you; and if you use nonrenewable resources to fuel current consumption, they will eventually run out. (10)

“The law of the minimum”: the factor in least supply is controlling....The most critical of all is water....salinization due to inappropriate irrigation plagued many ancient civilizations (and continues to be a problem today). Civilizations also damage watershed by cutting down the forests that moderate climate, promote rainfall, and store water. (11)

Consistently pressing ecological limits is risky to the point of being suicidal. Unfortunately, civilization does just that: as a system, its basic mode is overshoot and collapse.

If we ask why civilizations have constantly fallen into this trap, the answer is multifaceted...one important part of the answer is that ecological costs are not reflected in economic transactions. (11)

Thus the economy can boom as the ecology disintegrates. This is particularly true if the society resorts to currency debasement [which we have since 1971] or loose credit as a way to evade encroaching physical limits and foster an artificial prosperity, for then the economy becomes completely unhinged from concrete ecological reality. Overshoot and collapse is the inevitable result. (12)

Chapter 2: Exponential Growth

...exponential growth entails ever larger increments that tend to arrive at an accelerated pace. (15)

Nor is technology a panacea...It only postpones the day of reckoning – and briefly at that. In fact, technology is a double-edged sword. On the one hand, it amplifies the civilization's resource base and therefore enable growth to continue. On the other hand, precisely because it does allow growth to continue, it raised the stakes of the game. For if each doubling requires a quantity of resources equal to all that the civilization has consumed hitherto, then there must come a point when it will no longer be possible to supply it. (17)

The human mind is still fundamentally Paleolithic. That is, it was hardwired by evolution for the life of a hunter-gatherer on the African savannah, a life centered on day-to-day survival in small bands of intimates and kinsman. In practice, this means that human beings excel at concrete perception but are much less adept at abstraction. And **they are quick to perceive the immediate and dramatic but likely to overlook long-term trends and consequences.** They are therefore strongly present-oriented and tend to neglect or devalue the future. (17)

...if people sense that something is not quite right – civilization has gotten too big, too complex, too hard to manage – **they may still not see that the problems are caused in large part by exponential growth and that the solution therefore lies in controlling growth, not in programs or technologies designed to allow it to continue.** (18)

Chapter 3: Expedited Entropy

The laws of thermodynamics, among the most basic known to science, constitute a natural tyranny against which resistance is useless. (21)

The First Law states that energy is always conserved. It can change form, but it can neither be created or destroyed. However, the Second Law states that entropy tends to increase (where entropy is a measure of chaos, randomness, and disorder). In layman's terms, **this means that energy tends to decay into less and less useful forms.** In practice, therefore, every transaction of energy from one form to another incurs a loss. There may be just as much total energy after the transformation as before, but the quality of that energy will be poorer. (21)

The laws of thermodynamics...govern every aspect of the natural and human economies. It takes energy to perform work, to effect the transformation of matter or energy from one form into another, and all such transformations incur the losses ordained by the Second Law. (22)

One way of restating the Second Law, often called the entropy law, is to say that matter-energy transformations cannot be reversed; time's arrow flies only in one direction. **Thus when Humpty Dumpty takes his great fall, all the king's horses and all the king's men can never put him together again. His material "energy" has been irretrievably lost.** Similarly, when ice melts in a glass of lemonade, the cold "energy" stored in the ice cubes dissipates into the environment, never to be recaptured...our sun is slowly but surely radiating away its concentrated energy. Approximately five billion years from now, it will exhaust its fuel and eventually fade into a dim ember. In short, over time, energy moves inexorably downhill from a more useful or concentrated state to one that is less useful or concentrated. This movement is called entropy. **Unfortunately, civilization expedites entropy.**

...Industrialized agriculture...is a biological machine that turns petroleum into calories at a ratio of approximately ten to one. In other words, **the entropic price of modern man's bowl of porridge is the degradation of at least ten times as much energy as is contained in the bowl itself.** (23)

Technological improvements actually increase thermodynamic costs. Take the substitution of the automobile for the horse. To make a horse requires a modest investment in pasture, water, and fodder for the two to three years it takes from conception until the horse can work. But to make a car requires not only many direct inputs – steel, copper, fuel, water, chemicals, and so forth – but also many indirect ones such as a factory and labor force as well as the matter and energy needed to sustain them. **To use a technical term, the “embodied energy” in the car is many times that in the horse. In addition, the thermodynamic cost of operating the car is far greater.** (25)

...the enormous quantity of embodied energy in each computer and in the systems that support it, plus the major energy requirements need to operate networks. (25)

The more humanity resorts to technology, the more it expedites entropy. (25)

...gains in efficiency tend to be nullified by increases in demand, a phenomenon known as Jevons Paradox. (26) [Truth!]

The real concern for a civilization dependent on fossil fuels is not really the moment in time when the maximum rate of petroleum extraction is reached, after which production enters terminal decline, but rather **the inexorable trend toward lower net energy and higher costs, both monetary and environmental.** (27) [Like fracking!!!]

Civilization is trapped in a thermodynamic vicious circle from which escape is well nigh impossible. The greater a civilization becomes, the more the citizens produce and consume – but the more they produce and consume, the larger the increase in entropy. The longer economic development continues, the more depletion, decay, degradation, and disorder accumulate in the system as a whole, even if it brings a host of short-term benefits. Depending in a variety of factors – the quantity and quality of available resources, the degree of technological and managerial skill, and so forth – the process can continue for some time but not indefinitely. **At some point, just as in the ecological realm, a civilization exhausts its thermodynamic “credit” and begins to implode.** (29)

Chapter 4: Excessive Complexity

The problem of managing complexity has two major aspects. The first is sheer overload. Thanks to the exponential function, as civilizations grow the number of balls that need to be juggled escalates. Add in the difficulty of dealing with ecological exhaustion and diminishing thermodynamic returns, and the problem is bound to become overwhelming in the long run. The civilization’s very greatness makes it unwieldy – hard to control and harder still to change...The human ability to cope lags the accumulating problems, until the chasm between the demand for ingenuity and the supply of it can no longer be bridged. (33)

...There is a persistent pressure for complexity to increase; for the never-ending succession of problems can only be solved “by developing more complex technologies, establishing new institutions, increasing organization or regulation, or gathering and processing more information.” ...For the past 12,000 years human societies have seemed almost inexorably to grow more complex.” (Tainter) (33)

...simply maintaining the attained level of complexity in infrastructure, in regulation, and in expertise begins to consume more and more resources – human resources, capital resources, material resources – meaning that the society has to run harder and harder just to stay in the same place...The

historical record evinces a clear trend toward declining marginal returns on the human investment in civilized complexity. The investment yields relatively large gains at first, but as the level of complexity increases, the gains gradually diminish and may even turn negative. (34)

Modern civilization offers numerous examples of diminishing returns (34) [Examples follow – energy, education, public health.] (34-5)

...the enormous “productivity” of industrial agriculture is a sham. It is a machine for converting ten calories of fossil fuel energy into one calorie of food. (35)

...energy is the sine qua non of complexity, anything that diminishes the quantity, quality or efficiency of energy threatens a complex civilization’s survival. (35)

Civilizations are trapped in a vicious circle. They must keep solving the problems of complexity, for that is the price of civilized existence, but every solution creates new, ever more difficult problems, which then require new, ever more demanding solutions...civilizations enact a tragedy in which their *raison d’être* – **the use of energy to foster the complexity that raises them above the hunter-gatherer level of subsistence – becomes the agent of their ultimate downfall. (36)**

The second major aspect of the complexity management problem is that unpredictability and uncontrollability increase with every increment of growth, usually disproportionately...**Beyond a certain point, growth leads to a fundamental, qualitative change in the nature of systems. Specifically, it leads to what scientists call “chaos,”** meaning that a system is characterized by so many feedback loops operating in a nonlinear fashion that its behavior becomes more and more impenetrable and unpredictable and therefore less and less manageable, because neither the timing nor the severity of specific events is foreseeable...**Thus increasing complexity of a civilization inexorably pushes it toward the critical end of the spectrum, meaning that both the challenges and the risks of managing its systems begin to compound. (36-7)**

...limited, fallible human beings are bound to bungle the job of managing complex systems. What they can neither understand nor predict, they cannot expect to control, so failure is inevitable at some point. (37)

...company executives, legislators, and other decision makers often have a cogent grasp of the problem...but they miss the solution, because it is “counterintuitive” (i.e. surprising to the linear mind)...more often than not they push the change in the wrong direction...Sadly, therefore, those charged with managing complex systems are all too likely to behave in ways that grease the skids for decline and possible collapse. (38)

...the very fact that complex systems have key links and modes connected by multiple feedback loops means that they are vulnerable to a cascade of failures...systems that are too tightly coupled or too efficient are fragile; they lack resilience. That is how region-wide electrical outages propagate. The failure of one sector brings down another and another until the grid itself fails, and once down it takes heroic effort to get it up and running again. (39)

.. a general collapse [is] a catastrophe that propagates rapidly across a globe that is ever more tightly coupled. (39)

Complex adaptive systems are stable until they are overstressed. Then one perturbation too many, or one that arrives at the wrong moment, can tip the system into instability virtually overnight, with unpredictable and frequently distressing consequences. As Will Durant noted, “From barbarism to civilization requires a century, **from civilization to barbarism needs but a day.**” (39-40) Will Durant, *The Reformation: The Story of Civilization*

“...empires behave like all complex adaptive systems. They function in apparent equilibrium for some unknowable period. And then, **quite abruptly, they collapse...the shift from consummation to destruction and the to desolation is not cyclical. It is sudden.**” Niall Ferguson, “Complexity and Collapse: Empires on the Edge of Chaos” in *Foreign Affairs* 89, March/April 2010 (

...there may be no way to reform an advanced civilization...Once a civilization is plagued by numerous intractable problems, most attempts at reform will therefore either fail or make matters worse. Ironically it may be the very effort to reform that precipitates the collapse. It was *perestroika* and *glasnost* that allowed the stupendous fabric of the USSR to implode. Similarly, it was Louis XVI’s convening of the Estates-General that triggered the revolution and regicide that liquidated the *ancient regime*. (40)

Unfortunately, although naturally clever, human beings are not innately wise, especially in crowds. (41)

...any peasant knows that judicious pruning (i.e. reducing the complexity of trees) increases the health and yield of his orchard. So why don’t we prudently check the growth of our civilization and prune back our level of complexity to achieve resilience and sustainability? Alas, we never have. (41)

Chapter 5: Moral Decay

An Age of Decadence inevitably follows. Frivolity, aestheticism, hedonism, cynicism, pessimism, narcissism, consumerism, materialism, nihilism, fatalism, fanaticism, and other negative attributes, attitudes, and behaviors suffuse the population. **Politics is increasingly corrupt, at the expense of the citizenry, fostering a fatal opposition of interests between haves and have-nots. Mental and physical illness proliferates. The majority lives for bread and circuses, worships celebrities instead of divinities; takes its bearing from below rather than above; throws off social and moral restraints, especially on sexuality; shirks duties but insists on entitlements, and so forth.** The society’s original vigor, virtue, and morale have been entirely effaced. (49)

Stability and peace are bound to foster manufacture, trade, and the rise of a commercial class; affluence and all the later stages follow as a matter of course. And there is also no escape from the succession of generations; each new cohort grows up in altered circumstances that incline it to move further away from the original values, virtues, and ideals of the civilization. Rung by rung, the civilization drops ever lower on the ladder of decline. **Indeed, Gibson finds a remarkably regularity in the historical record...it seems to take a mere ten generations for a civilization to traverse the arc from elan to decadence. Hence they appear to have a natural lifetime of roughly 250 years that human action can do little to extend.** (50)

...political and economic expansion entails an increase in hierarchy and inequality. (50)

...maintaining a civilization takes a continuous input of matter, energy and morale, and the latter is actually the most important. **What sustains a civilization is a strong commitment to its values, practices**

and institutions...but.. they are bound to wither away We have already seen that matter and energy are governed by entropy – that is, they tend to travel downhill from a concentrated to a diffuse state (meaning they are no longer useful or valuable for human purpose)....the social order is also governed by a force that we can call moral entropy. (51)

...the positive feedback loop seems to be a virtuous circle. Who can object to becoming wealthier and more powerful? Or to increasing social welfare and scientific knowledge? No one. Only “reactionaries” oppose “progress.” **...So those living during the Age of Commerce will ignore the ecological exhaustion and thermodynamic losses that lurk in the future.** Similarly, the proponents of the welfare state will not account for its long-term political, sociological, and psychological consequences. Nor will they understand that they may be foisting an unbearable fiscal burden on posterity. And propogandists for the Age of Intellect will not conceive that a society in with a million opinions bloom could foster faction instead of consensus and thereby render the society ungovernable. For all these reasons, moral entropy tends to go unnoticed. Until the brute fact of decadence and decay imposes itself, the civilization seems to be on a grand march toward “greatness.” The farsighted few who warn that progress is sowing the seeds of decline suffer the fate of Cassandra. (42)

Human beings are barely evolved primates driven by greed, fear, and other powerful emotions. Hence, said Edmund Burke, “History consists, for the greater part, of the miseries brought upon the world by pride, ambition, avarice, revenge, lust, sedition, hypocrisy, ungoverned zeal, and all the train of disorderly appetite.” In addition, humans are only partly rational, so they suffer multiple mental aberrations – delusions, compulsions, manias, ideas fixes, and the like. Indeed, as we have seen, **the human mental and emotional constitution is better suited for hunting and gathering on the African savannah than for inhabiting a complex civilization.** At the pioneer state of the cycle, when mores are strong and deals compelling, the destructive aspects of human nature are kept in check. But as mores weaken and ideals fade, moral entropy works every more powerfully to degrade the citizens. (53)

Chapter 6: Practical Failure

...the inability of rulers and ruled alike (but especially the former) to deal promptly and effectively with the challenges posed by increasing numbers and growing complexity...[i.e.] practical failure (53)

As has been shown, a developing civilization grows steadily more complex and increasingly less manageable over time, preparing the way for its eventual demise. Only a race of supremely intelligent, rational, and wise beings could so order their affairs and so limit their behavior as to avoid this outcome. Human beings are not such a race. (55)

...they actively prepare their own downfall through greed, arrogance, obstinacy, shortsightedness, laziness and stupidity. **Because humans are more focused on the present than the future, and complex systems are unpredictable, decisions at all levels of society are bound to be increasingly “suboptimal” as a civilization grow in complexity.** (56)

In later times, when affairs are far from simple and morale is low, the opposite is true. Selfishness crowds out sacrifice, the interests of mass and elite diverge, and the elite itself is divided into warring factions. **Solvable problems turn into insolvable plights.** (56)

...civilizations suffer from a structural incapacity to respond to altered circumstance. It could not be otherwise. **Institutions are by their very nature resistant to change, for if not, society would be in a**

constant state of flux. As time goes on, institutions therefore grow steadily more hidebound, inflexible, and unresponsive...With its ways of thinking and acting set in concrete, increasingly blind to reality and to alternative possibilities, an ossified civilization descends into a terminal stagnation that prepares its demise. Like Gulliver, the civilization finds itself tied down by a multitude of vested interests – physical, social, economic, political, and psychological. Enmeshed in this legacy of the past, it cannot save itself. Even if the will to change existed, it would take prodigious effort and many decades to overcome the legacy, but the will is lacking. (57)

In the end, the elites prefer an advantageous present, however problematic, to an uncertain and possibly disadvantageous future. (57)

Bluntly, human societies are addicted to their ruling ideas and their received way of life, and they are fanatical in their defense. Hence they are extraordinarily reluctant to reform. “To admit error and cut loses,” said Tuchman, “is rare among individuals, unknown among states.” **Instead of changing their minds, leaders redouble their efforts to do what no longer works, wooden-headedly persisting in error until the bitter end.** (57)

Thus participants in the debate are, with rare exceptions, all partisan defenders of some vested interest or cherished ideology, however much they may couch their arguments in terms of the public interest. Moreover, the debate takes place in an emotionally charged atmosphere. The society is in crisis. What used to work no longer does. Institutions and infrastructure have broken down. A hypertrophied bureaucracy strangles the society in red tape. Rent-seeking insiders batten on the public purse, and selfish elites feather their own nests. The gap separating rich and poor becomes a chasm. (58-9) [Sounds familiar!]

In the end the social contract unravels. The populace and even members of the elite lose all faith in the system and in their leaders, who are seen as ineffective at best, incompetent and corrupt at worst. (59)

Faced with deteriorating ecological, physical, social, economic and political conditions and with declining returns on the civilization’s investment in complexity, **even capable and honest leaders have no viable way forward.** (59)

Although the problems may be insoluble, something must be done, and since expediency no longer suffices, they resort to stupidity – doing what had never worked in the past, what cannot succeed in the present, and what will destroy the future both morally and practically. **First by engaging in unnecessary wars** or imperial ventures that drain the civilization of blood and treasure. **Second by buying off the populace with bread, circuses, and entitlements,** thereby promising more than can be delivered over the long term. **Third, by deliberately debasing the currency** – that is, consciously adopting a policy of inflation. (59) [SOUND FAMILIAR???

...rulers bereft of backbone, ingenuity, and capital attempt to postpone the impending crisis by inflating, whether this takes the form of clipping coins, printing money or loosening credit. (60)

Keynes concluded: **“There is not subtler, no surer means of overturning the existing basis of society than to debauch the currency.** (61)

Once past a certain point, however, when the society has become so overextended that inflation is a desperate last resort, the delusion of control is revealed to be what it was all along: hubris. (62)

...a deliberate policy of inflation [what we have now] is tantamount to an abdication of responsibility and an admission of failure on the part of the governing class. It demonstrated that they have allowed the society's problems to become intractable and lack the competence or the integrity to deal with them. No matter how modest or benign it may seem at first, **an inflationary policy is therefore always suicidal in the long run.** It has been tried any times and has always failed. It does not solve the problems of the society; it aggravates them and leads inexorably on toward self-destruction. (62)

A mature civilization is caught in an entropy trap from which escape is well nigh impossible. **Because the available energy and resources can no longer maintain the existing level of complexity, the civilization begins to consume itself by borrowing from the future and feeding off the past, thereby preparing the way for an eventual implosion.** (63)

This is the tragedy of civilization: its very "greatness" – its panoply of wealth and power - turns against it and brings it down. (63)

"Sadly, history shows that most human civilizations overextend the growth phase of their adaptive cycle, so they eventually suffer deep collapse." Homer-Dixon, the Ingenuity Gap. (64)

Not surprisingly, fundamental reform is undertaken only as a last resort when conditions are already so dire that there is nothing left to lose. All that remains is to underscore the grim alliance of moral entropy and practical failure. Fatal alone, lethal together, they conspire to bring down a civilization whose growth has **exceeded the limits of what is physically possible and whose development had engendered a complex nexus of social, economic, fiscal, and political problems with no feasible solutions. At some point the "stupendous fabric [yields] to the pressure of its own weight," and the civilization collapses.** (64)

Conclusion: Trampled Down, Barren, and Bare

Civilizations are unnatural accumulations of wealth and power that cannot be sustained over the long term. Insuperable biophysical limits combine with innate human fallibility to precipitate eventual collapse...Decline and fall...is the product of a multiplicity of causes tending toward the same effect. (65)

Reducing the process to its essence, a civilization begins with abundant resources, inspiring ideals, strong morals, solvable problems, and high morale, "green and fresh," it accumulates wealth and power. However, its rise to dominance also prepares its downfall, for although greatness brings "bustle and abundance," it also entails scarce resources, faded ideals. Loose morals, intractable problems, and, in consequence, lost morale. In addition, because "the general tendency of wealth and power is to enervate a people, to make them proud and indolent," they succumb to hubris and become the authors of their own demise. **Every civilization therefore ends "all...trampled down, barren, and bare."** (65-66)

It will not have escaped the reader's attention that the signs and symptoms of impending collapse roughly sketched above are pervasive. Ecological problems, exponential pressures, thermodynamic losses, risky complexity, moral decay, and human incapacity are evident everywhere, differing only in extent and degree among the various regions and societies that make up modern industrial civilization. Moreover, all these societies are now interconnected in a vast and complex world system far beyond anyone's ken or control. **We therefore confront a potential worldwide collapse as a cascade of failure brings down a global order that is now approximately 250 years old** (i.e. close to what Glubb deems to

be the natural lifespan of a civilization). Having built up a “stupendous fabric” far beyond anything that Gibbon could have conceived, the implosion to come seems destined to be equally stupendous... **“Collapse...will this time be global,”** says Tainter. (66)

...a gradual and gentle transition to a viable agrarian civilization capable of supporting large numbers of people and a reasonable level of complexity is extremely unlikely. In fact, says Tainter, the collapse of today’s highly developed societies “would almost certainly entail vast disruptions and overwhelming loss of life, not to mention significantly lower standard of living for the survivors.” ...As we climbed the ladder of progress, we kicked out the rungs below.” Leaving ourselves with no non-catastrophic way back to a less complex mode of existence. (67)

...even a return to hunting and gathering would be challenging. Apart from a few bands of isolated Tupi-Guarani in the Amazon, almost all of the remaining, scattered tribal peoples have lost the territory, knowledge, and traditions that would enable them to survive if industrial civilization were to collapse. (67)

A military-industrial arms race among the sub-units of the existing global civilization “drives increased complexity and resource consumption regardless of costs, human or ecological. (67)

...the populace does not yet understand that the civilization has reached an impasse. As Tainter notes, “It takes protracted hardship to convince people that the world to which they have been accustomed has changed irrevocably.” (68)

...denial, evasion, and procrastination are all but inevitable. (68)

Bibliographic Note

...humanity must now either break through that ceiling to achieve “Singularity,” an unprecedented mastery of the historical process, or face a sudden collapse into “Nightfall.” In other words, according to Morris [Ian Morris, *Why the West Rules – For Now*], **the choice before humankind is utopia or oblivion, and achieving utopia will require a quasi-miraculous transformation of human culture, if not human nature. (72) [It also requires removing many gigatons of carbon in the atmosphere to stop runaway climate change – we have neither the proven, scalable technology nor the financial resources nor the political will to accomplish this.]**

...the demise of civilizations...is brought about by many causes that aggregate into an intractable problematique greater by far than the mere sum of the causes. (73)

...what we are living through today has happened many times in the past [except for runaway climate change, which is not survivable]. As populations and economies grow, the demand for goods outstrips supply. Elites seeking to preserve their status and wealth typically respond to emerging scarcity with inflationary policies that make matters worse. The result is social conflict or even revolution. (73)

When societies collapse, they often go temporarily insane...people mob together to form a crowd driven by irrational impulses. (74) [Well underway. This will NOT be fun!]

[Arnold Toynbee, *A Study of History*, 1987] ...his oft re-iterated conclusion that the death of a great civilization is almost always a suicide. (79)

Note taker's note:

What is different this time is that we have a GLOBAL civilization, operating with hyper connectivity and interdependence. And we have one shared atmosphere that we have pumped full of greenhouse gases and as a result have triggered numerous positive feedback loops that are warming the planet. This is a process that is increasing exponentially, as we witness with the dramatically increasing number of record breaking rain storms, hurricanes, typhoons, droughts, wildfires and temperature records, both hot and cold (as the jet stream has been dramatically broken up by a terrifyingly warming Arctic – the jet stream being what have up until now given us a stable climate for thousands of years). Agriculture cannot survive much more of an increase in extreme weather events (which are inevitably underway).

What is collapsing is not only our global civilization but our ecology. What survives will be dramatically different life forms that can tolerate extreme temperatures, like perhaps the microscopic tardigrades.

If you need to get up to speed, scan the excellent daily digests at [Climate and Economy](#).