

6.8. How might the Human Society Evolve

This section presents an abbreviated discussion on the prospects for the future of our Social Capital, that are obviously beyond the scope of this section article, but the informative in this and other Chapters provide information, actions and concepts that should help as reinforcing evidence towards the ongoing activities and polices related to a transition goal of sustainability.

The preceding arguments in previous chapters have painted a rather dismal picture for future generations. Here we focus on what we, as individuals can concentrate on raising our, cooperative consciousness and will to reorient our governments navigate through the five major crises: renewable energy, resource consumption, climate change, economic inequality, population growth and global peace to arrive at a sustainable condition. We argue against Business As Usual (BAU) and for Sustainable Development (SD) simply on the grounds of common sense and on moral prerogative.

6.8a Is Our Governance Gambling for a Better Future? Yes, it is and with a high risk of losing. Unless our human instinct for cooperation of hope becomes sufficiently planted in our consciousness such that we gain conviction of the importance and urgency of our current situation; and that we recognize that it is our responsibility'.to join an '*all hands on deck*' response that will be needed to constructively and with a reassurance that we do have the expertise and knowhow to design and implement proper action plans to achieve preventive solutions to all the seventeen goals expressed by the United Nations ^{fn}.(Of course, this sounds impossible I agree but so did Pearl Harbor! The positive aspect of this statement is that, if there is more than a~50% of the public that can comprehend and have the will to share by contributing what they can for the resolution of these goals. Such an effort would incite a contagion causing a near-unanimous calling for implementation of a science-based action by all sectors of their governance with a self-imposed conviction to cooperate in whatever manner they can. this acceptance hasn't happened yet!!

We note, that the scientific understanding in the UN was available in the seventies and has grown in the US albeit too slowly until mid decade when finally imported political discussions and actually partially implemented

during the Obama Administration. Unfortunately for the world the succeeding president ignored the implementation of these actions and effectively set back global attention and progress and practically doubling the cost of future success.

6.8b. Do Policymakers and Public Understand the Effects of Disturbances on Complex Systems? Probably Not enough. In ecology, a disturbance can be a or Shock or an enduring Stress, both of which can causes pronounced changes in a ecosystem. The complexity of the current crises requires an understanding how these crises are combining to create mega Stress disturbances to both the Human System and to Natural Systems, The first important step should be to identify the causal chains between internal connections leading between internal components, and all the indirect and indirect impacts they generated These casual chains can trigger a sequence of further impacts on other components of the system, such as lack of education, because of low wages suppresses opportunities for economic upward mobility. Of such as the changing Climate is doing by inducing: wildfires by drought, flooding by excess rain, hurricanes by warmer oceans.. The human system itself as a part of the Biosphere, also can produce devastating disturbances to itself in repercussion to direct abuses of the Biosphere: on, such as, over harvesting clearcutting, damming, impervious ground covering, fires, herbicides, introduction of invasive species, and most of all species extinction.

6.8c. Both humans and other life are self-reproducing and are subject to the slow process of biological evolution to survive and to to slow changes in their biospheric niche. These slow adaptations are genetic and effectively they allow them to self-correct to improve their species' resilience in their ecosystem. . Humans have a much greater consciousness that allows them to control their behavior including their interactions with Natural-Capital Components, for good, bad or mutualistic .Modern Democratic governance allows its society to assume the responsibility for caring and controlling Natural Capital within certain limits, which are turning out to be mostly destructive; that is, more for beneficial for economy than for preservation.. The governmental check on

this abusive situation is left to the social responsibility of the public to protest and seek legal restrictions on abusive use of natural capital which is often a difficult debate between the value of consuming or conserving the particular component of natural capital in question. Note, such cost-benefit evaluations are rarely done fairly.(see)

6.8d. It is essential information for a democratic constituency responds rationally and emotionally to disruptions of their social environment ,and in their expressions of how their needs are being curtailed or violated. because such effects inhibit the community's provision of basic needs.and their disposition towards their future. Policies for recuperation should consider utilizing a systems approach that necessarily would regard Social Capital of a community as a complex system composed of living and material components that has the function to provide liveable conditions to its inhabitants, and that has have sufficient resilience to remain stable under most external and internal disturbances. This requires a workable degree of mutualism that maintains among its constituency a sufficient level of cooperation, social responsibility, and commitment towards a shared goal of wellbeing. In order to evaluate deleterious malfunctions in the livability of a Social Capital system, one can identify damaged social market-components, human emotional responses to the damage, and how the loss might be replaced or compensated for. However, the non-market social components ,which cannot be repaired by money, need social attention, which in a marginalised neighborhood may hard to find. The fact that prolonged damage, neglect, or deprivation a neighborhood can lead to personal or community pathologies create a burdensome social debt.

6.8e. Certainly the Climate and Energy crises require immediate guided actions and be considered as a double National Security Issue. Because of its urgency and complexity that requires a fully multidisciplinary effort to formulate and implement solutions using a Systems Approach that is cooperative, and integrated throughout all active global governance components. Preferably this could be done in conjunction with international network (UN) that acts to make available Global problems, solutions, data, simulation models, and monitoring progress through, for example, the *UN*

international network for Climate Change .Opportunities for individuals or groups to help reversing the emissions, are compiled by Paul Hawkin et al. 2017, *The 100 Most Substantive Solutions To Reverse Global Warming, Based on Meticulous Research by Leading Scientists and Policymakers Around the World*".

6.8f. Do we have a Fair, Demographic Election Process? NO. When an election is very close or tied, it implies that opinion is perfectly polarized, or so poorly informed as to be random. Such a condition creates an indecisive, wavering direction for governance, particularly when oscillating between several conflicting political ideologies. This being the current US situation, with its corporate lobbying, gerrymandering, and electoral college that act to disallow, any sense of fair representation of the nation's policies,- let alone their priorities. This situation ignores the urgency and it impedes the badly needed revised electoral process and the urgency of a Transition Plan from the present business as usual, (BAU) to that of Sustainable Development (SD). The US example of making transition rests on a poor understanding of the individual and communal benefit offered by the differing political ideologies, and by foreign electronic influence in voting process..

6.8ge. Do we have Leadership by Citizens or Oligarchies? A still unresolved question. For the US this poses an immediate and critical, question, of what type of governing power could best lead us through these growing crises. If queried, the overwhelming answer would certainly be the latter. A transition, for either case, would inevitably involve a major cultural transformation that the public would have to adjust to and accept. Without a common alternative goal for our societies, such as is the **common-sense goal of Sustainability**. The continuance of the BAU approach will continue to usurp power over Natural Capital, by encouraging consumption and exploitation of our natural resources, material and environmental. It would also severely increase social inequality and mobility by it's pursuit of financial gain.. Whereas with a working democracy that focuses on a common goal of Sustainable Development and employs form the vast pool of disciplinary experts and available

technologies, coupled with a holistic transdisciplinary for an approach that could provide policy options that are scientifically reviewed and vetted for implementation by team multidisciplinary experts necessary to seek Proof of Sustainability and every developmental step. This procedure would require a public media the with best commitment to providing explanations of the course of progress or victories of Sustainable Development(SD) in all the governance sectors and publicly promulgated by non-partisan media. For either case the public choses, BAU or SD, will require living with or responding to difficult changes, that certainly will continue to be more damaging with the BAU, and continue to be less damaging with SD for a better and more stable societies. Therefore, either choice will continue to require a difficult cultural transformation; one colored by desperation and the other inspired by hopeful conviction for a better future.

6.8f. “Ah ,there is the rub!” It’s about Insufficient Comprehension, **Politicized Management, and Excess Corruption!** True !but shouldn’t we heed President’s Jefferson’s quote: **“I look to the diffusion of light and education as the resource most to be relied on for ameliorating the conditions, promoting the virtue and advancing the happiness of man.”** Without of a comprehensible policy enlightened goalcomprehension, abstract threats, whether true or fraudulent, act as a heat amplifier that feeds panic or wrong responses.

Also when encumbered by corruption a politician and his false promises, the voter looses his trust in in the politician and the election process. When responding to a proposed difficult policy change that appears to be a burden or unnecessary, it looses its priority status and support , of the voter. Consequently, abstract threats tend to breed skepticism and falsehoods, as is happening with ‘climate deniers’. One often believes a threat to be true or false after having heard the same from others which acceptance of its truth or falseness can grow exponentially (see Chap. 2.3).

Inefficient comprehension is not ‘an-either-or’ achievement, that can be legislated, instead it is gradual learning process that depends on a host

of a factors influencing the voter, such as: education, non-political social attitude, job related biases, religious beliefs, peer pressure, that all control their World Views to achieve the comprehension, rationale, and urgency sufficiently to influence their voting. through a bottom-up .process of scientific, social, and political coordination. Presently, this movement is still in gestation, and only exists in the eye of it's lovers, and sadly, its birth date has been postponed due to the current US administration's ^{fn}. lack of political will that is seriously obstructing the public's view on Climate Change. According to the Pew Research ^{fn}: *“Among the nations we surveyed, the U.S. has the highest carbon emissions per capita, but it's among the least concerned about climate change and its potential impact”*.

6.8f. Is the BAU so Obstructing, that it Needs a Sustainable Makeover? Yes! The fix-it-after-it-happens of the BAU approach is only abetting the intensity of these crises, by doing little, nothing, except to figure out short term Adaptation-measures, of striving to live under constantly worsening conditions and responding to one issue at a time. Because of the complex interdependencies of these issues exposed, which to a. mutual disturbance between

completely different complex systems (human & environmental). Instead the SD would take immediate catch-up measures.that would lay a foundation for implementing Adaptive Mitigative Preventive measures (Chap. 3. x) with a holistic Systems Approach to generate Preventive measures to stabilize the carbon balance to sustainable. livable limits. An example of connecting two solutions would be that of while, strongly reducing emissions, it would take to take advantage of the synchronism with the Energy Crises by orchestrating the reduction of fossil fuel with increases in our non-carbon energy sources and their infrastructures with a goal to non-carbon-all-electrified network with energy from solar-hydrogen —and other renewables (Chap. 5, sect).

6.8g. How Often do we Hear about Governing for Sustainability? Not much, but it is about time!? One should ask how the present Business-as-Usual (BAU) is putting us on the wrong Track to implement a Comprehensive Sustainability Plan? A major priority of a social democracy

fn, should not be a focus on the Financial Capital but on the living components of Social Capital and of Natural Capital. Therefore they should be the most valued recipients of governmental support: for Social Capital, because it is our framework for the self-governance that manages our societal needs; and on Natural Capital because, the public is fully dependent on its healthy function. If these dependences are not fully conveyed through the voting process or are corrupted by their political representatives, then social inequalities and environmental damage will increase. This requires that the eligible-voter population accept the responsibility to be informed, and understand these values, damages, and of their preventive solutions.. However if the electorate is uninformed, misinformed, or indifferent, they lose the power to influence those who represent them in the governmental policymaking process. The current BAU approach puts more effort into supporting Financial Capital, which tends to accumulate at the top and has no material value or moral constraints, and does have potential power, which if when used selfishly, it acts to consume Natural Capital and to neglect Social Capital.

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6.8h What Comprehension is needed? Both the public and policy need a broader awareness of each and all of these mega-crises and their combined impacts to the Human System and that these will require integrative, systematic solutions for a boarder holistic understanding and promulgation from appropriate scientific, social, experts, and educators. Meanwhile some of the starter solutions are strait forward, but are having birthing problems:

- 1) Take the money out of politics.
- 2) Stop oil Fossil fuel mining expansion transfer that funding to renewables, and use existing stock and our reverses.
- 3) Divest in fossil fuel and invest in renewable energy or the 'green' entity.
- 4) Encourage the Electrification for our energy infrastructure, which has already started by the Department of Energy.
- 5) Promote energy efficiency by not wasting it uncessaialy our energy footprint - get a calculator!
- 6) Revise and educate how policy solutions for multidisciplinary problems can be determined and implemented with a team of experts property chosen for their expertise. Avoid politicians and anyone who says "Let's wait and see what happens".

- 8) Support Sustainable Agriculture for Food's stake and for Climate's, stake.
- 9) Comprehend the what, why, and how of what we need to do to assist in resolving these crises.
- 10) Also, keep in your consciousness the slippery slope - the risk of a cascade collapse and how you can help avoid it!

Damaging Ongoing Side-Effects What should we also keep in mind the of these crises are using up taxpayers money and are having a reckless growing season!:

- 1) Honor, Value , and Preserve the Biosphere's capacity to survive productively and Worry about the fact that .is only producing half of its historical capacity and the population is growing at 80 million persons per year.
- 2) The biosphere rate of extinctions is 140,000 per year and growing
- 3) The global average national ratio GDP/public debt is 60%, for the US it is 104% (i.e. Bankrupt).
- 4) Voter turnout for the US is around 55%, the lowest in the OECD.
- 5) The US has the third highest inequality among OECD with a Gini Index of 0.45.
- 6) Extreme weather events are destroying our croplands, cities, and coastal zones.
- 7) The US is the second highest emitter of greenhouse gases after China.
- 8) A Global inequality that increases civil/political conflicts and incites mass migrations.
- 9) The US oil industry is frantically drilling up our lands just to claim dominance of global oil, and disregarding an ever-depleting resource that is causing inestimable damage to our planet.
- 11). Promote Electrification
- 10) Currently in the US is a bad example for leader to respond to the Global crises of climate of Climate Change, Energy, and Inequality

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6.9 Will the Rates of Cultural and Environmental Change Create Global Instability?

The economic and energy crises, plus the current lack of global collaboration, of these Crises are leading us to damaging **Disturbances** that will produce Environmental and Cultural Transformations! BAU Policies alone is not sufficient to orchestrate solutions for this crises. Needed instead is a complete multidisciplinary approach for its every aspect and a complete explanation of the meaning the Why, How and What of the needed for corrective solutions proposed to staff off the potential ,damage of this Mega-Disturbance,.. Thus, a full forecast of this issue is very clear, about how and what we should do, and more critically dependent on the attitude and will of the human population to do it.

6.9a 'What happens with Systems when Disturbed? In ecology, a disturbance can be a sudden or Shock or an enduring Stress, either of which can causes pronounced changes in an ecosystem's Function, Composition, and Structure that acts as Shock or an enduring Stress, either of which can causes pronounced changes in an ecosystem, Human and otherwise.. Shock disturbances often act quickly and with great effect that alters the physical structure or arrangement of biotic and abiotic elements, like a volcano, or wildfire. A Stress disturbance that continues over a long period of time, can gradually push internal components past their resilience thresholds that control a and thereby weaken or destroying the-stability and function of the ecosystem, like what the Climate Change disturbance is doing to the Human System. However, Climate Change is uniquely distinguished and causal with forces both external to the Human System (exogenous), and by forces internal to the Human System (endogenous) by emitting gasses to the atmosphere that imbalance the earth's heat budget. .Thus exogenous disturbances occur without direct causal influence by humans, such as geological movements extraterrestrial impacts; and atmospheric changes, where as endogenous disturbances

caused directly by human, self-inflicting actions, such as wars, famines, mass migrations, emissions, and plagues. It is these disturbances that can generate changes in any of the Earth's Systems geo-bio-aqua-spheres, Human Systems. Note, the present Political Disturbances to traditional Democracies have created a bifurcation point between correcting their deficiencies, succumb to Autocratic Regimes, or organize to a Sustainable Democracy.

Regaining Stability. continuance of a System requires a strengthening of affected components to have a level of resilience such that each can absorb expected shock and allow the System to regain stability. If the disturbance is too large or continues as a stress, resilience fails or persists long enough that the connected components create a degradation-chain of components until the disturbance stops. If the disturbance continues as a stress, it passes the shock on to its connected components creating a of weakening of receiving components and the System loses some or all of their function and becomes dysfunctional or collapses. Understanding the existence and vulnerability of such a complex chain from its first alert, is crucial to maintaining stability. Obviously, each of the components in the chain also have a resistance-threshold, or 'tipping point'; until pass which degradation it 'change of state'. For example, water boils until it reaches 100° C , and it changes state, and to steam. This exemplifies an 'emergent property ' that as steam no longer drinkable or whence turns to water, it is no longer skatable“A component either ceases to function, or it absorbs some of the shock and weakens, but if passes its tipping point it is transformed.

Thus natural systems a can adapt to a lower the exposure to stress. or evolve to improve the total resilience of the system. These resilient components evolve to the advantage of the organism. That is, by providing an avenue for genetic change to a more resilient level for reorganizing.However, human systems have the advantage of being consciously able to anticipate and prepare for disturbances and the potential capacity to more quickly rebuild or substitute damaged components their its former level or better. This is an important avenue to how humans can control their material evolution, but not their spiritual evolution (see Sect. 10).

6.9b. What are some Ongoing Endogenous Disturbances Leading to major Transformations of the Biosphere? In the sense of the high probability of a coalescence of the several major crises described in the previous chapters, and the growing trend of individual and societal-managements to selfishly enrich themselves at the overwhelming expense of the rest the population, other life, and its natural resources. The modern era has ushered strong cultural changes driving an accelerated transformations of Built Capital and Financial Capital that has overwhelmed the efforts to generate the compatible changes in Human and Natural Capital that would maintain a stable, just democratic Management. This discrepancy has caused Mega-Stress Disturbances through the collective damage of all their connected negative side effects of each the separate Crises discussed in this Document of Talking Points . Of course, most of the Built Capital was presumed to be for betterment of the human condition, without considering how instead it is pushing the Biosphere to an growing instability contributing to the destruction our societies' support system.. In the following subsections give only a few examples of problematic conundrums that are being created by BAU mismanagement of our Natural Capital - that all hope for will lead to a cessation and major transformation of its management!!

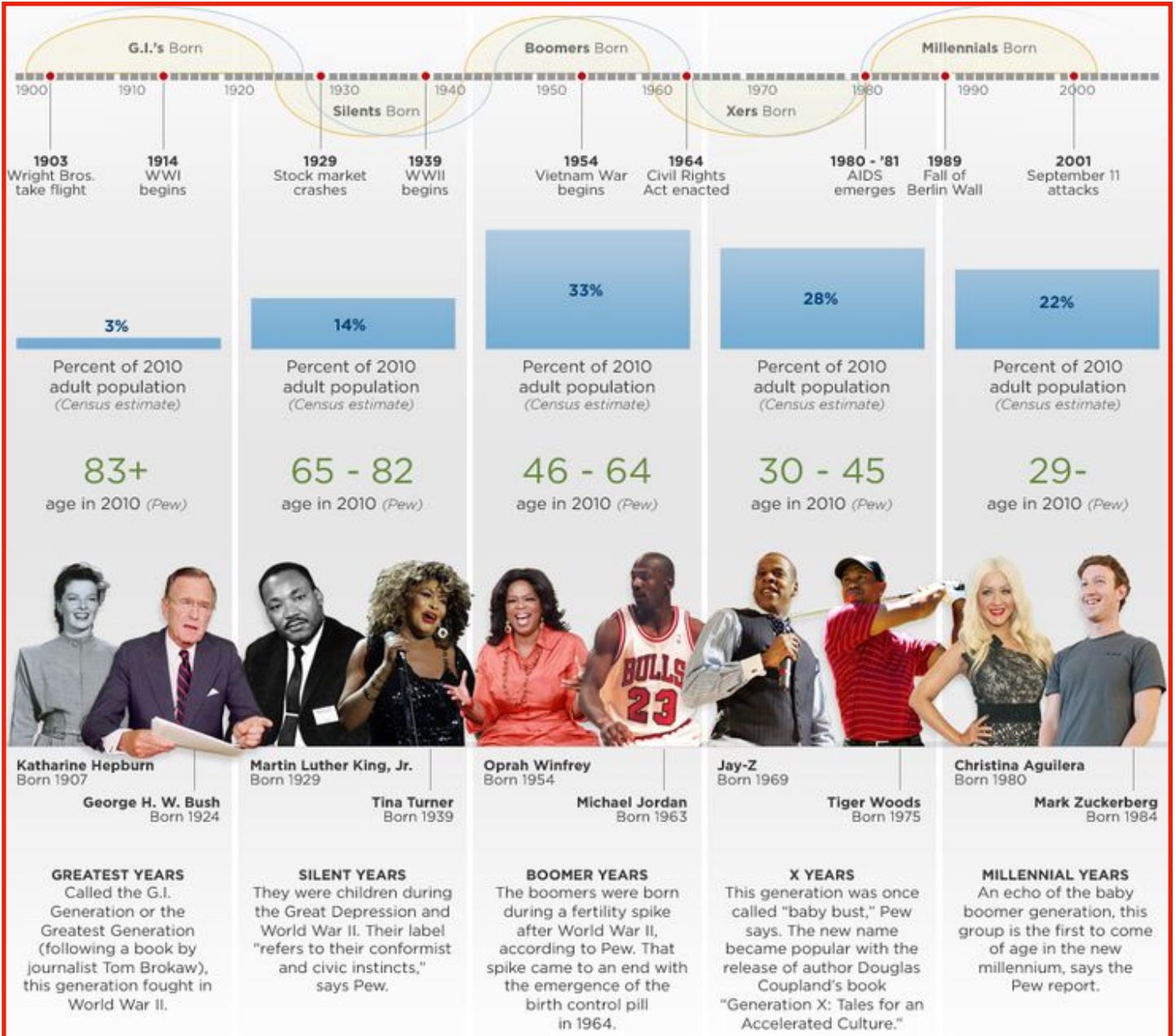
1) Consumerism. The modern societies are subject to stresses caused by rapidly changing technical advances that effect aspects of their day-to-day-life; for example, such as: i access to information, e-communication, types of jobs,, automated production, and medical advances These are primarily advances in external material aspects of Built Capital that enter the community more quickly than the time needed for internal aspects of Human Capital, such as learning new skills, or acquiring the knowledge and the experience needed for interpersonal interactions. This time lag creates a stress on the consumer and is driven by industries' goal of 'consumption for profit', which together with their 'Market Power', and planned obsolescence, all lead to excess waste, control the market all and other energy inefficient processes, like urban sprawl, waste, Climate, pollution, resource exhaustion.. Scientists have been witnessing the accelerating disrespect for Natural Capital since the seventies unconsciously without appreciating its future value. This driven by conventional rationale of the BAU: that more people leads to more consumption of goods and more economic growth. The source

of these commodities are treated as free for human use. but with the further assumption that Natural Capital commodities, like water, air, fish, trees, and soil are treated as non-commercial assets, and not valued except for further development of Built Capital, and as potential Financial Capital. , baby boom, , habitat destruction, and to a shift in governmental focus primarily on financial growth, environmental degradation, and not for the human condition.



2)

Generation Change. A number of researchers ^{fm} have noted that major technical changes are occurring at increasingly shorter intervals, indicating that cultural change is accelerating Generalizing, we expect some people tend to have a sense of pride and or others alarm with the frequent advances of Information Age ;and how it has changed how teachers now teach, the tools for learning; and because from what grand-folks advise or preachers sermonize, is no further applicable to their grand children. These create a feelings of obsolesce that is not relevant to their social lessons of history, which grow less vivid less and applicable. This contrasts to the wisdom deriving form of the value of learning and accepting change. Generational change also has an effect on international inequalities with those born in nations not having the educational exposure nor the money to keep up with elite generations born in the developed nations.and makes them more vulnerable to the growing impacts that these crises are creating. Aspects of



traditional education also become obsolete, compared to what and how teachers now teach, grand-folks advise, or preachers sermonize. is no further applicable to their grand children, and the social lessons of history grow less vivid, but not less important because of the value of also learning and accepting change.

Generational change also has an effect on international inequalities for those born in nations by not having the educational exposure nor the money

to keep up with elite generations born in the developed nations and makes them more vulnerable to the growing impacts that these crises are creating. Fortunately the UN's The **UNESCO** program 'Education for All', is a part of the Millennium Development Goals aims to provide free, universal access to primary schooling, has been successful in dramatically increasing enrollment. However, complete enrollment is hindered by the childhood chores necessary to support their families, causing many kids to drop out before finishing school.^{fn} Much of present higher educational curricula is geared to meet the needs high salary jobs. This can add to an educational and economic gap that opens up through the middle in technical, financial, and business sectors with lower-paid workers. This tendency amplifies the economic and knowledge gap that splits the country. Perhaps not so obvious is the importance of life-experience education', that enriches the academic experience and expands understanding of the the importance of every day micro-cultures of the laborers, merchants, service-providers, fishing, and farming, who provide the substance and function of our society. These programs can usually be inserted at some point in a student's curricula. This experiential learning helps them to better understand and integrate into the whole culture, and to provide a broader knowledge to select their choice of occupation, for example with, Universities to the

populations of the three economic levels diverse life styles, new connections, and the shared needs and interests. between built in live time. built-in obsolescence, which in industrial design and in economics is a policy of planning or designing a product with an limited useful life, so that it becomes obsolete. The rationale behind this strategy is to generate long-term sales volume. These changes are justified by the intention of making products better for the consumer's culture with the desire to live more conveniently, comfortably, or stylishly. culture of how we live that often have problematic side-effect problems about how we employ ourselves, communicate with each other, and feed, entertain, shelter ourselves, the intervals. and are accompanied by increasing levels of technology, ways of living, and environmental damage. public property related to the financial growth, baby boom, , habitat destruction, and to a shift in governmental focus primarily on financial growth, environmental degradation, and not for the human condition. This condition was specifically indicated in the preceding chapters

by the other major threatening instabilities in our culture. , mentioned in preceding chapters. One should realize the causes of some of these other could be arrested by human efforts, except for those components already irreversibly damaged on a human or geologic time scale, such as species extinction and massive deforestation and soil degradation. These ;because of the ongoing extinctions attributed to the environmental disturbances caused by human activities, that become dominant enough in changing the Planet Earth to merit it as a separate geological epoch..

3) Species-Extinctions. The Biosphere is now in a state of transformation, through a selfish ignorance that has suddenly brought us to this point. The lost wisdom that we should not ignore but are slowly understanding as a society and are being regained among some of the informed, earth-loving folks, and by too few of those in power! But our actions testify fact that, we are never the less continuing to rapidly destroy Natural Capital, and instead of grasping the need to conserve it is an unacknowledged crime against Humanity. Especially so, when at this late stage we should respect this responsibility and could actually change our ways for sake of future of societies. This habitual presumption that modern man is the *'King of the Jungle'* has prevailed as a justification to own and destroy the jungle as we want. Unfortunately Darwin did not live long enough to correct this misunderstanding that it was not meant for systems. A human system on an island can only survive if it has a mutualistic relationship with its natural system. Ancient man and Indigenous people worked out a mutualistic relationship to survive. But this constraint as human Development became capable of over plundering their Natural Capital and continues in our with modern generations and with the BAU;and is escalating by the pressure of the ever increasing population, overconsumption, over-pollution that are causing species exhaustion and atmospheric change, both of which are generating permanent damage and transformations of the four Planet's main systems of Air, Sea, Land, and Life.. That is, when one's generational wisdom and knowhow appears obsolete or out of date relative to that of one's replacing generation, it disorientates ones good intentions. To avoid confusion the new generation must sort out the no-longer valid from the valid. Our modern This exercise has only weakly entered into the present political

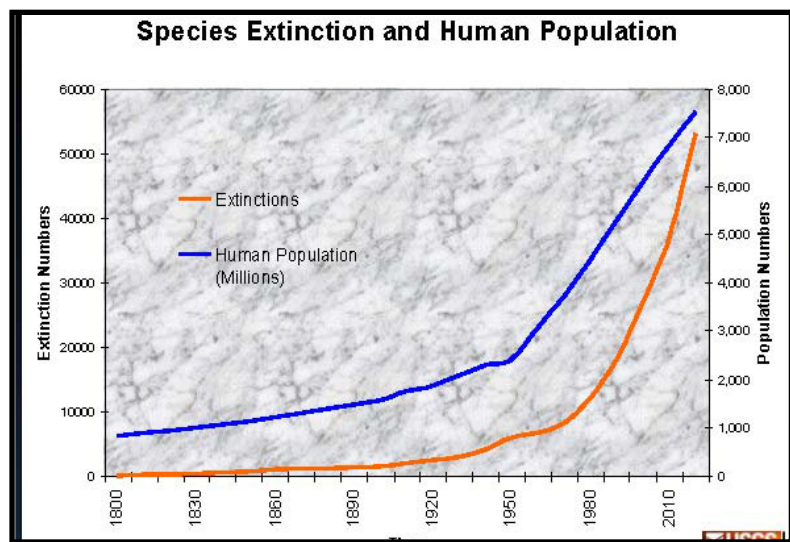
consciousness as evidenced by the totality by which the Biosphere has been severely damaged, and brings to mind the analogy of the Humpty Dumpty Story, Figure 22.



Figure 22 *Alice's Unintentional Gesture Disturbs Humpty Dumpty into an irreversible transformation!!*

This unattended problem is continuing to damage life-habitation at all biological levels of species' and causing the biosphere to suffer another historical crippling Mass Species Extinction event that is also impoverishing Human Destiny is ironically called the Great Acceleration (Fig. x). It is posing the of extra-normal rates of bio-extinctions that began in the eighteen hundreds, when the rate of extinctions began to grow exponentially to present time powered by increasing Human population, over-harvesting, Industrialization, habitat-destruction, pollution, and by climate change

Figure,23. Correlation between Bio-Extinctions



and Human Development. The blue line illustrates the growth of human population and of its activities, the red line illustrating the increase extinctions.

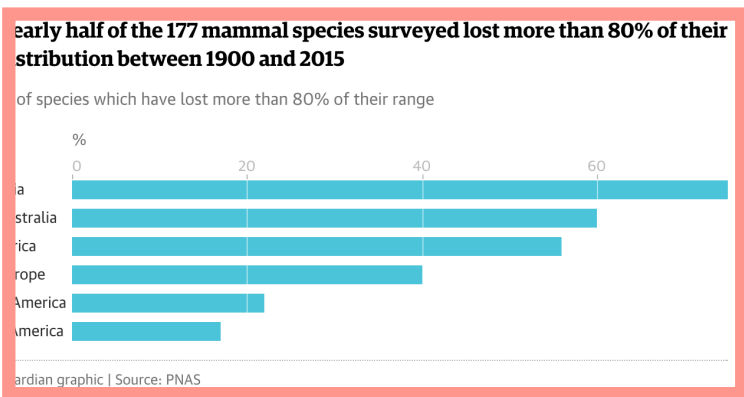


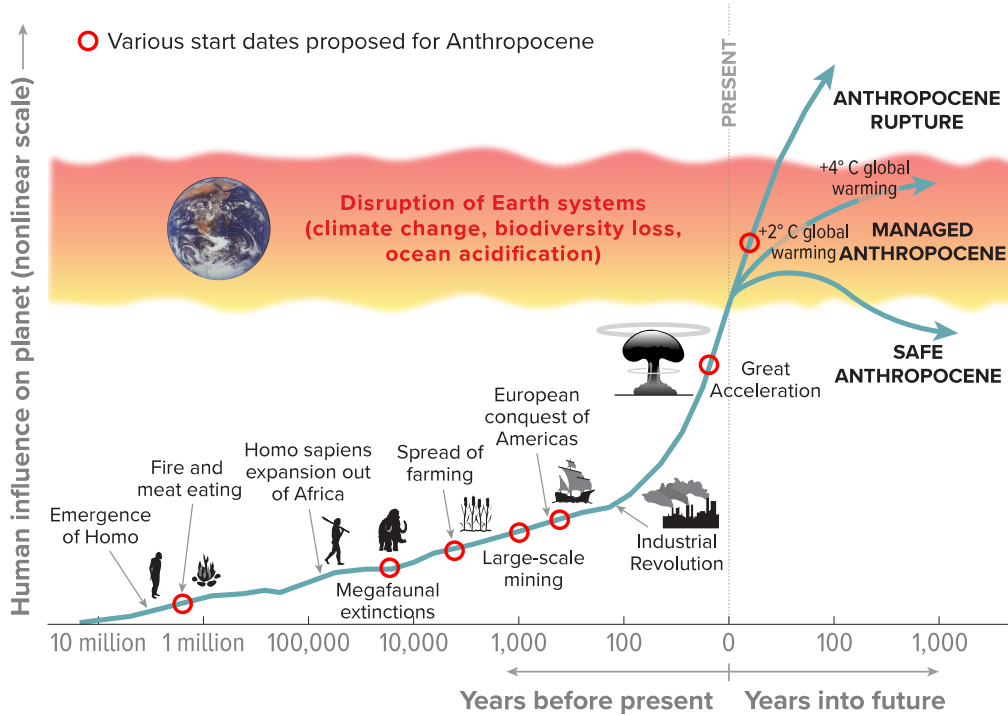
Figure 24. Images of environmental malpractices to keep in mind. From upper left: Pacific plastic island; rate of African elephant killings for ivory; beached whale poisoned by sewage outfall; illegal tusks destroyed by smashing or burning; bottom

Hello, Anthropocene?

Humanity's effects on the Earth justify a new geological time period, some scientists argue. A working group proposes a start date for this epoch — the "Anthropocene" — in the mid-twentieth century, a period known as the "great acceleration."

C Aug 23

The group is surveying geological sediments for the clearest signs of human activity, such as traces of plastics, fertilizer use and plutonium-239 from nuclear tests.



SOURCE: Y. MALHI / ANNUAL REVIEW OF ENVIRONMENT AND RESOURCES 2017

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trawlers taking every thing for sale or rot; amazon deforestation burning every thing to grow commercial crops. Shown on the lower left is the impact on large mammal species that are so essential for the survival large ecosystems.

Figure, 25. Illustration of the Great Acceleration. The blue line represents the path of extinctions up to the present and continues with protection in to the future that depend on how humanity responds to its neglect of Natural Capital.

The Great Acceleration. This figure provides a timeline of human development, including a extrapolation further past the present. The human activities are further detailed below he rapid rise in plant and animal species extinctions over the last hundred years due to human activities has reached proportions resembling the last five Mass Exogenous Events, is used as evidence that the current situation should noted as the sixth Mass Destruction and the only endogenous one created by life on a planet.through mega disturbances on all three of its Natrual life-Systems. Such evidence as the changing sea-levels, mass extinctions, and climate impacts will sum up to qualify this 'modern period' of the Holocene as the 'Anthropocene'; and it will be viewed as the period during which human activities were the dominant force for planetary change, and it will be clear that Humans were so complacent as to not appreciation of the collective value of the Earth's ecosystems' for their survival value - and perhaps as message to the Universe!

6.10 Planetary Considerations

In this section discusses the extra-planetary setting of the earth in respect to some of longer-termed events controlling its climate relative to the Climate-Change discussion.

6.10a.. Holocene. The current geological Epoca/Era of Ice ages (Holocene) defined by has been referred to as a 'golden age' for human development. The presence of oceans and the present continental configuration is extremely unusual. The North Pole is covered by a nearly land-locked ocean, the Arctic; and the South Pole by a continent, Antarctica. Both are covered with ice: the South Pole with Land Glaciers and the North Pole by Sea Ice. Both tend to cool the earth: The Antarctic continent blocks ocean heat from arriving at the extreme southern latitudes; the Arctic Ocean is mostly frozen over and, therefore, reflects heat and insulates the atmosphere from the heat of the ocean.

The earth's current orbital position, the sun is closest to the sun, with its oval orbit, and the rotation of its tilt its rotational axis is also tilted to the sun. The most pronounced periodicity is that of 100,000 years but periods of 22,000 and 41,000 years are also discernible. These are now referred to as the Milankovitch cycles, which determine the amount an variations of sunlight over the earth's surface. This condition as a result of cyclic distance to the sun due the orbital variations of with occurs controls on the Earth's orbit around most of the timing of the the Ice Ages. cycle. These are:

1) The tilt of the earth's spin axis between 21.5 to 24.5° over a 41,000 yr period. We are now mid way at 23.5°.

2) The shape of the earth's orbit. A seasonality to the amount of sunlight is imparted by the ellipticity of the earth's orbit, which changes from circular to maximum elliptical (~6%) over a period of 100,000 yr.

3) The wobble of the spin axis has a periodicity of about 23,000 yrs. Like a shining top, the earth is slowly wobbling. This means that the time of the summer solstice changes with respect to the earth's position in the orbit.

Right now our summer solstice is on 21 June and the aphelion (furthest point) at 4 July, a coincidence of time that they are so close.

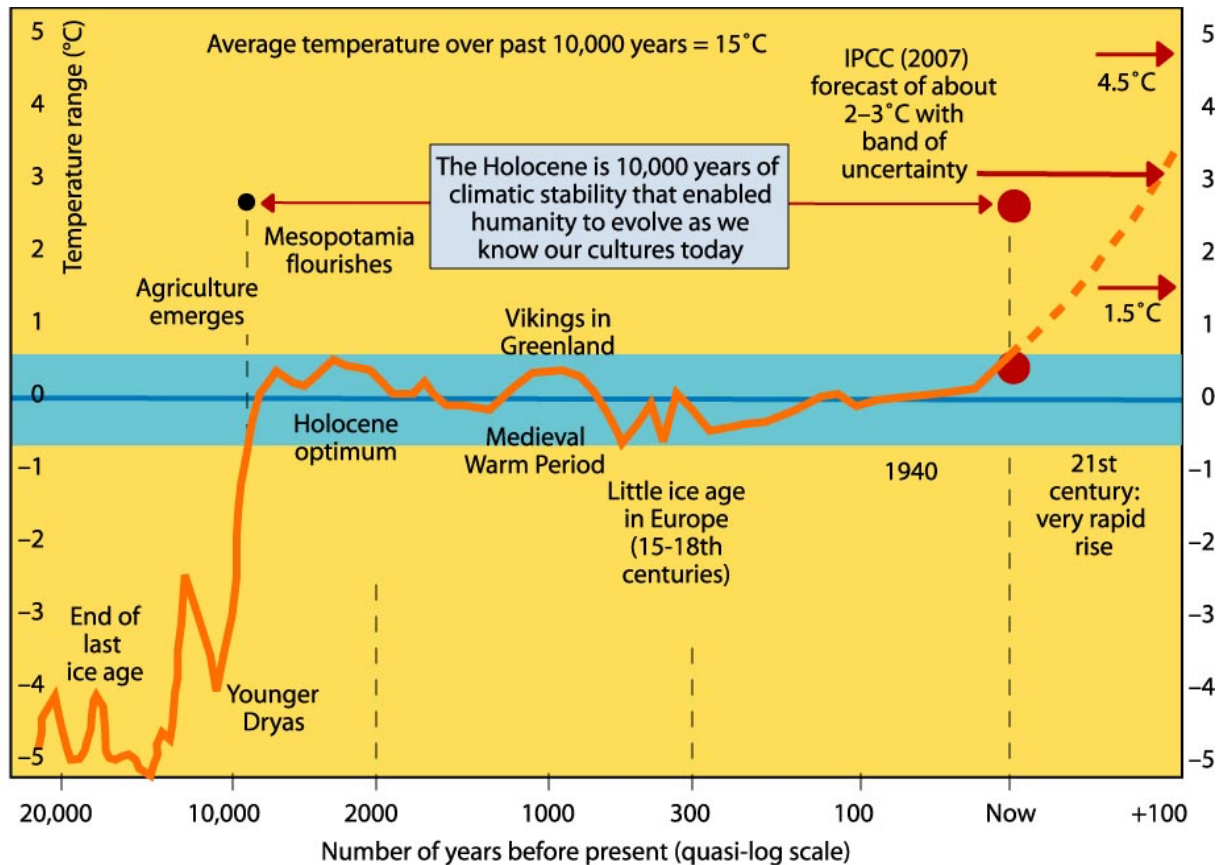
is most tilted to the the Northern Hemisphere,,with its much greater land annual exposure to the Sun.

the southern hemisphere being closest to sun.

This golden age provides maximum sunlight for photosynthetic to grow plants and consequently both herbivores and carnivores. life needing o the the northern hemisphere, which as the most land mass that is being in the the system in the solar to life and human prosperity, but is now it is being viewed as the period during which human activity is destroying the very conditions needed for human life to prosper. For example, extinctions caused by human interactions are highly correlated with the the population growth of humans (fig.1)with the Biosphere over all three of the natural systems. atmosphere, are of such a magnitude and uniqueness that it should be separately named as the anthropocene epoch dating from the beginning significant human impact circa 40 Kya, T

Thus, human life being the dominant driver of change of the planetary change is currently a little over half-way through an interglacial period of the Holocene, which is predicted to end in about 5ya. Hence, this leaves little time and resources for a resurgence of human prosperity T h e arrival of the next ice age begin will begin when ice cover begins to accumulate during the Northern summer seasons. The Holocene and the preceding Pleistocene together form the Quaternary period. The Holocene has been identified with the current interglacial warm periods. Scientists argue that human impacts on all three of the planet's natural systems justify naming the naming current period the Anthropocene. Figure 25 demonstrates the amplitudes of its variations, until the present strong deviation from climate change. each historic variation , each of which strongly influenced societies primarily on their agricultures and migrations as they adapted to climatic changes. Important to understand is that each of the variations were due to climate changes driven by increased solar activity, decreased volcanic activity, and changes to the interactions between atmospheric oceanic circulations in the Atlantic and Polar regions ^{fn}. The period was followed by a cooler period in the North Atlantic and elsewhere termed the Little Ice Age. The fact that the climate variations undulate around a mean during an interglacial period. If humans succeed in revising emissions by stoping the greenhouse warming effect, we will have made a large variation in atmospheric temperature, but we we be able to survive in it?

Are we already in the Anthropocene? Wikipedia defines the Anthropocene as, “the current geological age, is viewed as the period during which human activity has been the dominant influence on climate and the environment.”



William Ruddiman^{fn} has argued that the proposed Anthropocene began approximately 8,000 years ago when glaciation began to recede and allowed the slow development of farming, **Figure 25. The Earth's Temperature During the Holocene.** This red line shows the variations in temperature from its beginning with the end of the last ice age to present-time, forecast for the next one hundred years.

sedentary cultures, and the use biofuel for fire". This agricultural transformation involved the clearing forests for crops and wood for energy initiated the long history of human interference with biosphere. With the use of petroleum during and after the Industrial Revolution circa 1850, both the biosphere and the atmosphere began to be further impacted, and without sufficient politic, except for a growing concern among natural scientists. the Human The biosphere suffered from species extinction through habitat loss and over harvesting. While the human system was gaining from

unsustainable harvesting for food, it began to tap into the enormous supply of fossil fuel for manufacturing and transport.. Whence began the climate disturbance that has that has been accelerating ever since. Much of the

accompanying environmental change (species extinction due to, loss of habitat due to changes (physical, biological or chemical on Earth is suspected to be a direct consequence of the Industrial Revolution, and its squandering usage of this cheap energy, however, this is not say that humans did not benefit immensely, by enabling **an** extraordinary sequence of .positive cultural advancements. The tragedy is that we did not recognize the irreversible damages to our Natural Capital, on which we depend.

In fact we presently we are passing the threshold of no-return for the fo key components of the Biosphere, for many of the key minerals, fuels, and much of the other valued assets of nature like rainforests, stable coastal zones and a favorable climate. The tragic irony is that we have done this without much cognizance of the damage of implementing corrective actions, or of informing the public to raise their concern sufficiently to preventive polices. The progress of knowledge transfer about certain endogenous treats to our Natural and Social capitals from scientific sectors to the governance sectors is too slow in our US Democracy. Not solving these endogenous problems, like climate change, nature conservation, and social inequality, have taken four decades to get on the drawing boards of Policy, and are still lacking the necessary implementation of the corrective measures needed. This is happening in very complex manner, because of the interactions our human culture and the biosphere are intertwined and caught in a manner based on selfishness and lack of respect for the intrinsic value that Nature offers.

An other faulty economic mistake is that in commercial activities the fact that the intrinsic value of the Natural and Capitals and can not be directly substitutable in monetary terms. But they can be valued in sense of their productive capacity to enhance social development. This neglect of the potential and future values is the primary cause.of biosphere damage Violating this caveat destroys both Natural and Social Capital.

The current Mass Extinctions are primarily a result of violations of the caveat. The evidence will certainly be left in the signatures in marine and terrestrial sediments, along with other non-degradable materials as clues of our civilizations's. of changes in its composition and structures, as artifacts of our societies' and influence on atmosphere and biosphere to the Earth's System. Such evidence such as changing sea-levels, mass extinctions, and climate impacts will sum up to qualify for the denotation as an extremely particular geological era; and it will be viewed as the period during which

human activity was the dominant force for planetary change. In perspective the earth is currently a little over half-way through the interglacial period of the Holocene that began approximately 11.7 kya before present. This gives Humans about 5 k years more to perish in our artifactual waste, or to survive in our modern igloos when the Northern summers are pointed away from the sun and snow cover begins to accumulate during and usher in the next ice age begins of ~100,000 year duration.

Other exogenous events. Holocene epoch's time scale is marked by major Exogenous disturbances from driven primarily by forces beyond the control of humans such as from the geologic, astronomic, and solar energetic events that disturb one or all of the three Earths Natural Systems. Hence the original cause of the events by the monitoring and from our deductive knowledge from previous events. . The more severe events occur at longer than a human generational or time scales. However, if one such Disturbance should occur at a time human societies are already disturbed by an endogenous disturbances, it would certainly amplify the risk of a devastating quasi- global collapse, depending on the geographic extent. [Many of us find it hard to accept this potential reality].

Examples causing disturbances by forces outside the control of Humans are due to changes in:

- 1) The **surface geology** by super volcanoes, volcanic basalt flooding; earthquakes; plate tectonics; continental movements sub-marine volcanism,
- 2) The **Aqua-sphere** oceans, rivers, and lakes by pollution, temperature, fish production, sea level, circulation patterns, access to chemicals: O₂, CO₂, carbon, nitrate, phosphorus, calcium,
- 3) The **Atmosphere** by (its chemistry, temperature, precipitation, and circulation patterns)..
- 4) The **Biosphere** by (habitat changes, diseases productivity, extinctions.
- 5) The **Solar System** by (asteroids, sun flares, ice ages, continental drift, and Solar flares, orbital changes of the sun.

Scientists argue that human impacts on all three of the planet's natural systems justify naming the current period the Anthropocene. Holocene

extinction Present volcano theory – at University of Colorado “Such big eruptions have happened before. In 1815, for example, Mount Tamboura in modern-day Indonesia ejected a historic volume of ash and sulfur dioxide high into the air. The plume lingered in the atmosphere, shading the planet and disrupting weather around the world, called “The year after in history is known as the year without summer,” said Kalnajs^{fn}, also of the Department of Atmospheric and Oceanic Sciences. “There were crop failures all over the world, and there was ice in rivers in Pennsylvania that didn’t melt until June.”

- | | | |
|---|---------------------------------------|--------------------------------------|
| 2 | Cretaceous–Paleogene extinction event | 65 million years ago |
| 3 | Triassic–Jurassic extinction event | 199 million to 214 million years ago |
| 4 | Permian–Triassic extinction event | 251 million years ago |
| 5 | Late Devonian extinction | 364 million years ago |
| 6 | | |
| 7 | Ordovician–Silurian extinction events | 439 million years ago |

C.11 Historically How did Human Transformations Disturb the Biosphere?

Because human development has depended heavily on the earth’s resources that appeared to be infinite relative to the view point of early populations. They were preoccupied by concerns for their survival and not for the abstract concept of extinction that even now has not fully entered into the collective consciousness of modern humans.

6.11a. What is it Important that humans understand their Historic Relationship between Human Transformations and the Environment?

In order to briefly summarize how the evolution of Humans transformed their relationship with the Biosphere from mutual to predatory over the course of history, it is important to understand now what early humans could not fathom how future Humans would abuse Nature’s vast reserve of resources that certain key species would be invaluable for future generations and their serve to the conservation of Nature’s wealth would develop. This ignorance

has led to selfish abuse of power over the Biosphere that seemed to be a gift from God; and one that that further humans will have to recognize and understand, apropos to a complex system that has suffered a internal damage will necessarily suffer damage to its functionality. We might interpret the ;Great Acceleration (Fig. 25); as indicating that we have the easy option to just all go extinct together with all the components connected to it; or hopefully to wakeup and to chose the more difficult option of repairing and increasing the resilience of each link in chain of connected internal components, whose function plays a critical role in stabilizing our System's function.

How do we do this? The history of how the mutualistic interactions between human development and natural resources has evolved should help us understand the current relationship that threatens the healthy survival of both the Human ant Natural Systems. Because Humans are the predator in this relationship and have the superior consciousness, they must be responsible to bring their interactions with Natural Capital back to a mutually sustainable balance. This change cannot wait for a slow genetic change or even adaptive genetic solution. On a ecological time scale the urgency for a change requires an instantaneous behavioral change in human societies. A generational time scale this can that only be done by internalizing the moral need and survival value for achieving this goal in our in individual and collective consciousness, within few generations and consider as irrevocable as - analogous to the universal law of "*thou shall not kill one another*".

To do this we must reacquaint and internalize our ourselves with the value of and lessons learned from Mother Nature; and that the Human System, can-not survive if it does not live within, the resilience limits of the planet's Terrestrial, Marine, Atmospheric, Systems. Also if, we humans continue to abuse by harvesting, polluting, and occupying Nature and its many key components, we will lose our irreplaceable support system.

Much of the 20th & 21st century scientific research results^{fn} have been increasingly warning us of this danger: Simply, by advancing our Built Capital and neglecting our Natural Capital, and some with notable side-affects to Social Capital that are not well parceled between these two Capitals. In sum,

we are still severely degrading the Biosphere. In support of this statement is that some technical advances that provide more convenience to humans have no moral limits^{fn}. Now, four decades later, the scientific warnings efforts have not been able to achieve a successful knowledge-transfer and internalization of this critical information which is necessary for political action of the remedial actions needed, and of the cooperative will to avoid these ongoing side effects that are enforcing what might be called the Great Crises Collation and its consequences.

6.11b. What was the Early Human Relationship with Nature.

Sarich and Wilson, 1967.^{fn} estimated the period of divergence for the apes to be 4 to 5 Mya. It is deduced that the anatomically human species *Homo Sapiens* separated from the apes depended not just on population growth but on their available energy expenditures, and on how they used them. as their dependence on resources grew, so did the human impact on them grow. this imbalance was alleviated by expanding the areas harvested until exhausting their energy limits to do so. As the population grew, the resources were became unsustainable. At this point, they would have had three options, all with probable limits: forage a larger area, migrate to another location, or cultivate their land. If another location was already inhabited, they would be obliged to starve, leave, fall in love with inhabitants, or fight them. ^{fn}

6.11b.Important Early Human Transformations,150kya. The anatomically human species *Homo Sapiens* with are characterized as having Behavior Moderntiy,^{fn} or display behavior and traits similar modernity similar those that are universally similar among modern pex oples.

1. Use of Fire 600Kya^{fn}. Undisputable evidence of the use of fire The fist direct evidence of the use of fire by modern *Homo sapiens*. that transformed their life style and culture, Fire was used as a biomass energy-

source for warmth and light that permitted activities; clearing of vegetation for cultivation, defense or offense against enemies; tool making by burning silica. cooking an extended their diet and increased the digestibility and health of their diet that increased their Lifetimes. The early use of fire provided an invaluable advantage to humans with relatively no damage to the biosphere - until later developments.

The Paleolithic Era (or Old Stone Age) is a period of prehistory from about 2.6 million years ago to around 100,000 years ago. The Neolithic Era (or New Stone Age) began around 10,000 BC and ended between 4,500 and 2000 BC in various parts of the world. In the Paleolithic era there were more than one human species but only one survived until the Neolithic era. Paleolithic humans lived a nomadic lifestyle in small groups. They used primitive stone tools and their survival depended heavily on their environment and climate. Neolithic humans discovered agriculture and animal husbandry, which allowed them to settle down in one area. The Mesolithic era followed the Paleolithic era but the period of the Paleolithic–Mesolithic boundary varies by geography by as much as several thousand years.

Insert 1. Provides a Time Guide to this Discussion.

1. .Use of Fire 600Kya. Undisputable evidence of the use of fire The first direct evidence of the use of fire by modern Homo sapiens. that transformed their life style and culture, Fire was used as a biomass energy-source for warmth and light that permitted activities; clearing of vegetation for cultivation, defense or offense against enemies; tool making by burning silica. cooking an extended their diet and increased the digestibility and health of their diet that increased their Lifetimes. The early use of fire provided an

invaluable advantage to humans with relatively no damage to the biosphere - until later developments.

. **What was the Neolithic Revolution?** From the ending of last Ice Age, circa 12kya, and the beginning of the Holocene, the Neolithic or New Stone Age began around 10,000 BC with the climate warming into the present interglacial and ended between 4500 and 2000 BC in various parts of the world. With the climate change of the Holocene, the Earth began to warm making more suitable conditions for human habitation and plant growth. The Neolithic Era began with the most recent variant of humans (Homo Sapiens) which migrated north out of South Africa, the eastern Africa and into the middle east and to the west into southern Europe, only to meet another human version, the Neanderthals. It may have taken humans hundreds or even thousands of years to transition fully from a lifestyle of subsisting on wild plants to keeping small gardens and later tending large crop fields practicing unique traditions, they retain social, cultural, economic and political characteristics that are distinct from those of the dominant societies in which they live. Spread across the world from the Arctic to the South Pacific, they are the descendants - according to a common definition - of those who inhabited a country or a geographical region at the time when people of different cultures or ethnic origins arrived. The new arrivals later became dominant through conquest, occupation, settlement or other means.

The Paleolithic or Palaeolithic, also called the Old Stone Age, is a period in human prehistory distinguished by the original development of stone tools that covers c. 99% of human technological prehistory. It extends from the earliest known use of stone tools by hominins c. 3.3 million years ago, to the end of the Pleistocene c. 11,650 cal BP.

https://www.differen.com/difference/Neolithic_vs_Paleolithic
Comparison chart

Neolithic versus Paleolithic comparison chart

| Neolithic | Paleolithic |
|-----------|-------------|
|-----------|-------------|

| | |
|---------|---|
| Meaning | Neo=new; Lithic=stone. Neolithic era is also call the New Stone age. Paleo=old; Lithic=stone. The Paelolithic era is also called the Old Stone age. |
|---------|---|

Dwelling Mud bricks supported by timber Mouths of caves, huts, skin tents

Lifestyle Sedentary. They farmed in permanent settlements and raised/ herded animals; agriculture was discovered and became a major source of food; families evolved. Nomadic; in groups of up to 50; tribal society; hunters and gatherers

Tools polished stone tools made sharper by grinding Chipped stone, wooden weapons, light stone tools (not sharpened)

Clothes Animal skins, woven garments Animal skins

Governance Military and religious leaders had authority. Monarchy emerged. Tribal society. Clan controlled by elders or the powerful (according to age)

Economy The concept of private property and ownership emerged for things such as land, livestock and tools. There was no concept of private property.

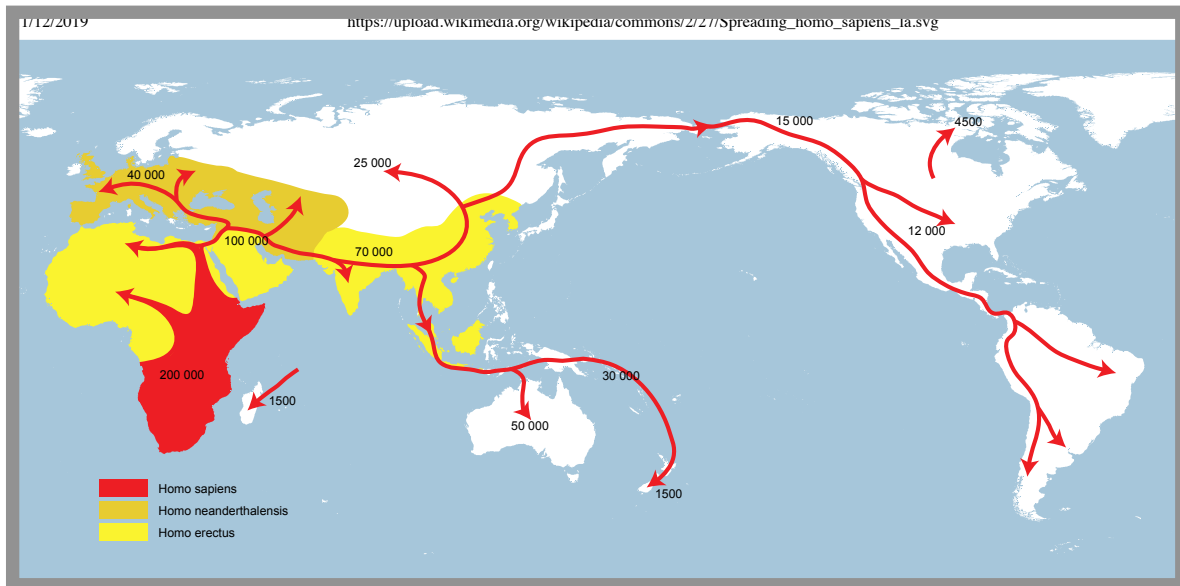
Health Neolithic people were shorter and had lower life expectancy. Diseases like tooth cavities and typhoid emerged in the new stone age. Neolithic women had more children because the life style was no longer nomadic. Paleolithic people were taller and lived longer than neolithic people.

Art Wall paintings Cave paintings

Sculpture material Stone, clay (baked) Stone, mammoth ivory, reindeer horn

Main Discovery Agriculture and tools with polished stones, the plow
Fire; Rough stone tools

Food They grew crops such as corn, wheat, beans, etc. Hunted and gathered for their food supply.



2. Use of Language, 40Kya. HC The beginnings of Language has left no material evidence other than the inference of activities that would be improbable without some form of communication. For example the nursing-raising of children, the hunting/killing of large animals, and the use of fire and of cultivation. the later transformations. Some form of prototype communication was necessary to enable the necessary for families and groups to function. However, writing they gained another avenue to express communication of abstract concepts, such as Feelings, Morality, Cooperation, Expansion, Trade, and Transmission of Knowledge, **BC** Skills and Tools that allowed for collaborative hunting, fishing with nets and other cooperative activities, in particular, that of nurturing their offspring. **HC** Although these activities impacted their local environments they provided an understanding of the ecosystem that defined their niche and the limits of a mutualistic relationship that ensured their societal survival spread across the world from the Arctic to the South Pacific in the most difficult environmental habitats.

2. Agricultural Revolution. The life-style difference led to a bifurcation into two cultures which would have required a spoken language instead of grunts

and signals that enveloped spoken language over thousands of years to: those who chose to continue the life style of hunter gathers, which eventual led to nomadic practices of Pastoralism, and Indigenous Cultures; and to those who chose to settle and cultivate their food, which became agriculture cities, states, and empires. As these settled populations continued to grow their options for sustainability were threatened by insufficient water, food, by invasion, and by poor leadership.

Since occupying lands for food facilitated the population growth allowed or a more sedentary life style that more time for women to be with their infants than when they carried their infant in the hunter-gather lifestyle. To serve their growing population survive, they developed tools, domesticated animals to reduce labor of animals and use of the plow reduced laborer required for farming allowed the population to grow within the limits of food, health, safety.and even store food. better communications and commerce in towns and cities; and it allowed growth of cultural issues, such as Inequality, competition, and conflicts between ethnic groups and other cities

For example, the knowledge learned by indigenous tribes that still inhabit the earth with these activities provided a platform and learning for their cultural development.which led to the use of

From the view point of archeological and anthropological evidence of progress is in the remaining artifacts, and from deductions made from them of their material, age, substance, quality, refinements, and their distributions. This distinction separates the advances of Built Capital and Human Capital. Cognitive progress is demonstrated by evidence of; personal interactions, art, music, rituals, education, organization, and of commodities of convenience and comfort, as opposed to the progress in material artifacts in hardware, tools, weapons, use of fire, and utilization of the Biosphere. In other words between the growth of Behavioral Modernity[™] and technical capacity. Note 'ya'= years go, 'Kay' - thousand years ago, and 'Mya', a million years ago. The two capitals are designated BC & HC. Note, the aspects of transformations of human development were not simultaneous in time, in geographic distribution, nor similar., With time they we're improved and more large distributed .but over the Globe and were The following list contains a sampling of these two components taken from B. H.Banathy and A. Takkacs-Santa[™]

Modern Indigenous Peoples are the descendants according to a common definition of those who didn't remain with the emigrating peoples but remained in lands or a geographical regions that were not suitable for cultivation, and were present later when people of different cultures or ethnic origins arrived and settled. These later arrivals became dominant through conquest, occupation, settlement or other means.

Who are indigenous peoples?

It is estimated that there are more than 370 million indigenous people spread across 70 countries worldwide.

Practicing unique traditions, they retain social, cultural, economic and political characteristics that are distinct from those of the dominant societies in which they live. Spread across the world from the Arctic to the South

Pacific, they are the descendants - according to a common definition - of those who inhabited a country or a geographical region at the time when people of different cultures or ethnic origins arrived. The new arrivals later became dominant through conquest, occupation, settlement or other means.

Among the indigenous peoples are those of the Americas (for example, the Lakota in the USA, the Mayas in Guatemala or the Aymaras in Bolivia), the Inuit and Aleutians of the circumpolar region, the Saami of northern Europe, the Aborigines and Torres Strait Islanders of Australia and the Maori of New Zealand. These and most other indigenous peoples have retained distinct characteristics which are clearly different from those of other segments of the national populations.

For example, The *“Indigenous people and nature: a tradition of conservation In the culture of the Maori people of New Zealand, humans are deeply connected with nature; the two are equal and interdependent, even kin. The idea is reflected in the Maori word ‘ kaitiakitanga ’, which*

means guarding and protecting the environment in order to respect the ancestors and secure the future.”^{fn}.

Considering the diversity of indigenous peoples, an official definition of the “indigenous” has not been adopted by any UN-system body. Instead the system has developed a modern understanding of this term based on the following:

- Self-identification as indigenous peoples at the individual level and accepted by the community as their member.
- Historical continuity with pre-colonial and/or pre-settler societies
- Strong link to territories and surrounding natural resources
- Distinct social, economic or political systems
- Distinct language, culture and beliefs
- Form non-dominant groups of society
- Resolve to maintain and reproduce their ancestral environments and systems as distinctive peoples and communities.

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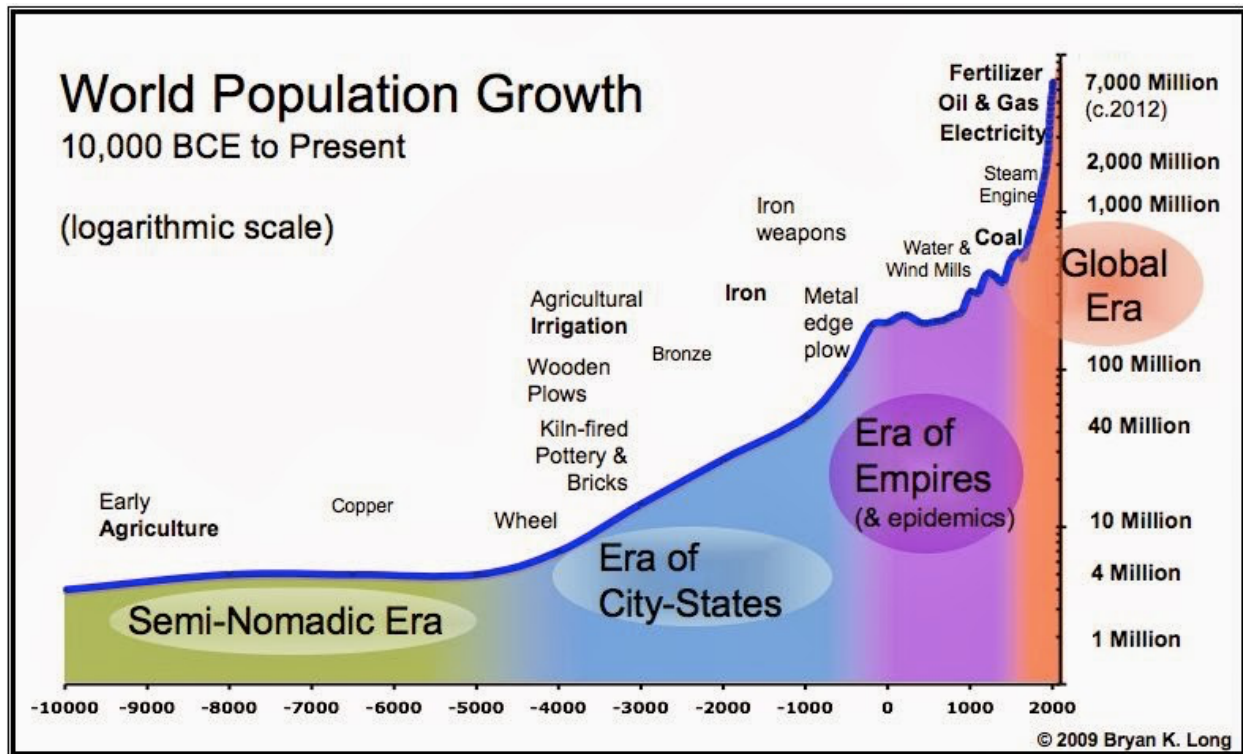
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other indigenous peoples have retained distinct characteristics which are clearly different from those of other

segments of the national populations.



3. The Use of Agriculture 10-,5kya.BC The use of the plow has had an enormous positive on human populations, until recent agricultural science has exposed its multiple, negative impacts, such as contributing to soil loss through water and air erosion, over drafting of aquifers water, and of soil fertility by destroying the micro bio-chemical ecosystems that recycle nutrients and chemicals. Many modern practices continue to ruin the soil, like by mono-cropping, and exaggerating the malpractices that lower its natural fertility or desertify the soil, and in particular greatly increase carbon emissions for climate change

6.The Scientific/Technological Revolut

6.9d. How did Human Developments Transformed the Biosphere.

In order to briefly summarize how evolutionary positive advances of Built Capital that has allowed humans to modernize to their present societies at the expense of more than half to Natural Capital to the point of mutual destruction. In discussing the this situation it is important to distinguish between evidence of advances in the Built-Component from the Human Component of Social Capital, and also to separate the regressive progress in Natural.Capital from the evidence for positive progress in Human Capital'

Writing. This is an example of a cultural development that has no direct damaging on Natural Capital but an enormous effect on Human Capital, except for explaining activities that do it.

https://upload.wikimedia.org/wikipedia/commons/2/27/Spreading_homo_sapiens_la.svg

www.unenvironment.org/news-and-stories/story/...

3. Agriculture,.

4. Civilizations (States). 5,000 ya. As agriculture practices grew sufficiently to accommodate higher populations, causing cities to grow even to large urban centers that endangered their agricultural lands until they became unsustainable. With the mechanized tools to save human labor providing water for irrigation and, wood for housing and energy, this growth needed greater appropriation of natural resources that then destroyed natural ecosystems and their habitats, and *animals to extinction in the*

Mediterranean Basin from Spain to Turkey, just for their enjoyment in the Coliseum. The Roman agricultural economy greatly encouraged this process and having no counterbalancing conservation ethic. The Romans hit hard at their environment, but it struck back! Deforestation, the depletion of soils, and the exhaustion of mines were all factors in the fall of Rome's Empire. The Romans didn't finish the job, however. The last great plundering of Mediterranean forest resources occurred in the late Middle Ages, when the demand for timber for fuel and shipbuilding was very great. As a result, there's very little first-growth sclerophyllous forest left in the Mediterranean basin today. Consequently, the deforestation, depletion of soils, and the exhaustion of mines were all factors in the fall of Rome's Empire".^{fn}

<https://www.motherearthnews.com/nature-and-environment/greeks-and-romans-zmaz80mjzraw>

https://www.history.com/topics/pre-history/neolithic-revolution#section_

A rather poignant exception is that of the Greek islands, when in 500 BC, Plato observed that: *"What now remains compared with what then existed is like the skeleton of a sick man, all the fat and soft earth having wasted away, and only the bare framework of the land being left"*. Not having read Plato, the Romans completed the deforestation *during the Roman Empire—from the hills of Galilee in Palestine and the Taurus Mountains of Turkey in the east, to the mountains of Spain in the west. Similarly they, drove large wild*

Figure 25.,with the exception of the strong increase inmate to front of chart

5. Conquests and Colonization. By the 15th century Europeans had ocean-going sailing ships which they used to colonize the New World and profit from its rich minerals and ecosystems. This resulted in many agricultural exchanges of native tropical crops between countries and hemispheres. For example native corn and potatoes adapted well to the european climate. ships which they used to colonize the New World and profit from its rich minerals and ecosystems. This resulted in many agricultural exchanges of native tropical crops between countries and hemispheres. For example native corn and potatoes adapted well to the european climate.

6. Scientific/Technical Revolution. Mid-1800's to 2000's. Now ongoing governments are attempting to implement a conversion to fossil fuel as energy source, and its accompanying emissions from manufacturing and power generation created serious health problems industry shifted to become more urbanized mass-production, immigration raises population cities, and generated air and water pollution. air pollution from the due to , cities became more urbanized and dominantly most production became has and cities became urbanized.. The transcontinental railroad, and interstate turnpikes mechanized mining deforestation and multiple trawl fishing. the cotton gin electricity and a host of other inventions permanently damaged ecosystems a society agriculture mechanicalized its practices. *In the 1800s the US and the origins of the environmental movement lay in the response to increasing levels of smoke pollution in the atmosphere during the Industrial Revolution.* The emergence of great factories and the concomitant immense growth in coal consumption gave rise to an unprecedented level of air pollution in industrial centers; after 1900 the large volume of industrial chemical discharges added to the growing load of untreated human waste.[2] Under increasing political pressure from the urban middle-class, the first large-scale, modern environmental laws came in the form of Britain's Alkali Acts, passed in 1863, to regulate the deleterious air pollution (gaseous hydrochloric acid) given off by the Leblanc process, used to produce soda ash

7. Information Revolution.

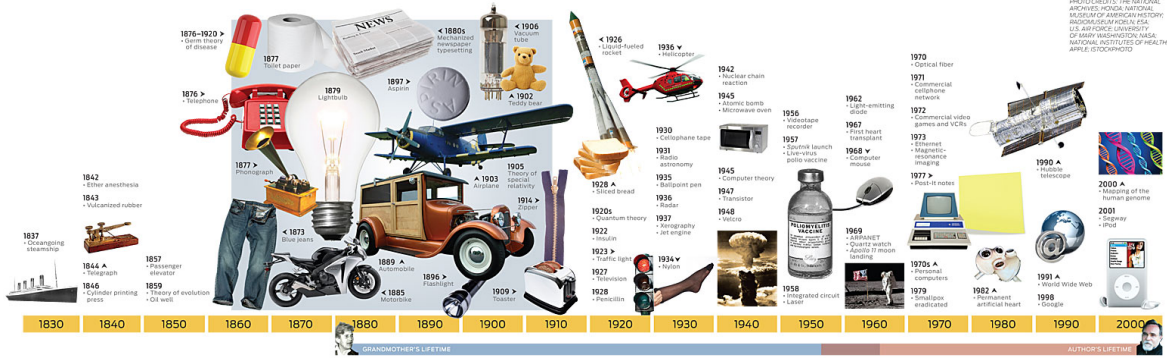
TECHNOLOGY

Beyond the Information Revolution

PETER F. DRUCKER

OCTOBER 1999 ISSUE

http://www.dr-yo.com/writing_history_of_media.html good to 2000s



Industrial Revolution The Industrial Revolution marks a major turning point in history; almost every aspect of daily life was influenced in some way. In particular, average income and population began to exhibit unprecedented sustained growth. Some economists say that the major benefit of the Industrial Revolution was that the standard of living for the general population in the western world began to increase consistently for the first time in history, although others have said that it did not begin to meaningfully improve until the late 19th and 20th centuries. <https://www.historyhit.com/key-inventions-of-the-industrial-revolution/>

The First Industrial Revolution.(c.1760-1840) introduced many new inventions that would change the world forever. It's introduction exemplifies the beginning of manufacturing products for trade over a wide spread distribution. of areas. The list below describes five of the many inventions that saved labor, and transport easier and long distance communications possible, and reduced labor for women

1) In 1764 by James Hargreaves invented the **Spinning Jenny**, This was a key development in the industrialization of weaving. The device reduced the amount of work needed to produce cloth, with a worker able to work eight or more spools at once. could spin many spindles at a time and enabling the textile industry to provide jobs for women and trade income for the men.

2) James Watt Invented the first **practical steam engine**. Watt's engine was very similar to earlier versions but it required less fuel to run and was more efficient and attractive to potential buyers. It became the prototype for many for f main source of power for a large variety of British industries. It was to rail in 1812 for slow trasport of heavy of iron and coal.

3) In 1837, George Stephenson redesigned the Watt engine to 1812 and made a more **advanced locomotive** called the Rocket, which had smoke chimney in the front and the fire box behind and a separate fire box in the rear – became the template for future steam locomotives for the next 150 years.

4). Telegraph communications. On 25 July 1837 Sir William Fothergill Cooke and Charles Wheatstone successfully demonstrated the first electrical telegraph that was installed between Euston and Camden Town in London.

5) The photograph

In 1826, French inventor Joseph Nicéphore Niépce invented the first permanent photograph of a camera image. He took it from his window using a camera obscura, a primitive camera, creating the earliest surviving photograph of a real-world scene.

The Second Industrial Revolution. Some of the events characteristic of the Second Industrial Revolution can be attributed to earlier innovations in the manufacturing industry, such as the establishment of a machine tool industry, the development of methods for manufacturing interchangeable parts, and the invention of the Bessemer Process to produce steel .

Advances in manufacturing and production technology allowed the widespread adoption of pre-existing technological systems, such as telegraph and rail networks, gas and water supply, and sewage systems, which had previously been concentrated in select cities. The expansion of the railway and telegraph lines after 1870 allowed an unprecedented movement of people and ideas, culminating in a new wave of globalization. In the same period, new technological systems were introduced, more significantly electrical energy and telephones. These advances continued into the 20th century with the electrification of the factory and production lines, and ended at the beginning of World War I.

7. Information Revolution

When did computer science become an industry that would change history? Was it with Alan Turing and his Turing Machine during World War II. Was it with the establishment of The International Business Machines Corporation (IBM) which made computers essential for industry? While we think of the domination of IBM starting around the 1980s the history of the company goes back as far as 1911. As an IT professional, how much do you know about the history of your chosen field? Let's take a look at a brief high level timeline.

1911: The Computing-Tabulating-Recording Company began after a merger of the Tabulating Machine Company, the International Time Recording Company, and the Computing Scale Company. In 1924 the company changes its name to International Business Machines.

1940: Harvard university creates the first large scale digital computer called Mark 1. It was programmed using punch cards.

1945: The first discussion of computer architecture and stored programming is published by John Von Neumann called "First Draft of a Report on the EDVAC."

1971: Steve Jobs and Steve Wozniak meet and eventually collaborate on what would become Apple computers.

1973: The Ethernet is born from a memo written by Xerox researcher Bob Metcalfe.

1975: Bill Gates contacts Micro Instrumentation and Telemetry Systems (MITS) about their Altair 8800 computer. He says he has created a system called BASIC for it. The company agrees to see him but he had not created any such thing yet. BASIC becomes very popular and Microsoft is born.

1989: Tim Berners-Lee writes and releases a proposal on information management with a complete outline for the concept of a global hypertext system.

1993: The World Wide Web is made available free of charge.

1997: Deep Blue, a smart computer designed by IBM to play chess, beats chess master Gary Kasparov. This led to the creation of Watson, another smart computer, which then competed on Jeopardy.

The 2000s saw the birth of smart devices that allowed everyone to have access to information from their fingertips. This, once again, changed the trajectory of information technology and computer development.

Klein According to scholar Richard G. Klein <https://pumpkinperson.com/2016/10/29/behavioral-modernity/>, by about 50,000 years ago, a major change had occurred in human behavior (described as behavioral modernity, the great leap forward, or the mind's big bang). Suddenly, the number of artifacts humans could make had exploded, suggesting an increase in behavioral plasticity.

According to Klein, before 50,000 years ago, virtually everyone thought you could only make artifacts out of stone. After 50,000 years ago, they suddenly realized you could use bone, ivory, antler or shell.

Before 50,000 years ago, people didn't spatially organize their living areas. In other words, they would cook, clean, eat, etc, everywhere in their living space. After 50,000 years ago, people suddenly realized they could divide their space into a cooking area, and eating area, a cleaning area, etc.

Before 50,000 years ago, humans buried their dead only to dispose of the corpse. After 50,000 years ago, burials suddenly became ritualistic and ceremonial.

Before 50,000 years ago, humans didn't produce art. After 50,000 years ago, art becomes common.

Before 50,000 years ago, humans didn't fish and their hunting techniques were less efficient. After 50,000 years ago fishing becomes common and hunting becomes efficient.

6.11. Why not utilize a Science-Policy Interface to assist Governance? implementing solutions for these crises issue.check T&D..

System Analysis is a necessary tool for diagnosing the disturbances of complex systems. It involves using our scientific knowledge to understand the stable state, its normal function, its composition components and linkages between them. This information can reveal causal the chain between the disturbance to the system and the dysfunctional origin that produced damaging impact. By identifying the dysfunctional component(s), offers an opportunity to replace, repair, or substitute the dysfunctional component. If Large complex Natural and Human are diverse enough to resolve the problem. Of course, its not simple for complex systems that have components with multiple connections to other components of the system and their responses may not be linear ...etc.

Roughly in this way scientific management can be applied to systems disturbances if foreknowledge is available of what to expect and how to deal with them. Meteorological management is an excellent example having achieved a high level of local weather forecasts and enormous data base for use to tract the changing climate and its impacts. Note that fo the climate case we know the cause but cannot enact preventive measures/alternatives against ourselves .

have its cause and effect-of the issue considered and monitor its status, and ;its the threshold limits of stress of the natural or social systems and their component systems that created the problem we are concerned with because, our health and survival depend on their health and function. and in human systems throughout the full spectrum of cities, organizations, to their complex health is ours. such as the mega systems of the biosphere and of the human systems as their component systems f cities from the very largest urban cities. to small rural towns systems, like Climate, marine life, forests, stability species at risk of extinction.and etc., which scientists are doing with insufficient progress with political law makers. and take preventive measures to reduce the cause of their stresses. An example would be that of the energy crisis could be seriously cut/stop mining fossil fuel and use our current oil-coal reserves while accelerate the electrification the transportation and utility sectors. weakening chain of affected components and thereby losing some or all of their function until, the eventually, the System collapses. Understanding the existence of this complex chain from the first alert, is crucial to maintaining stability. Importantly,, each of the chain components also have a resistance-threshold (tipping points), which if a shock is not absorbed by component, it will be passed on to it's connected component and so forth until the shock is completely absorbed and will contribute to a crippling of the System or it adapt to lower the exposure of the stress. or evolve to improve the total resilience of the System to the particular stress to which it was, exposed. In living organisms, such evolutions act to the advantage of the organism, by providing an avenue for genetic change to a greater total resilience.The fact that functional changes in a system can be evaluated through a process of system simulation to evaluate policy options. This process greatly simplifies the simulation policy options for Sustainable Development, and if good monitoring data or system are available the simulation provides a means of comparing different policy options for better proof of sustainability. If the results are made public, they can aid the voter in one's selection of the policy. assuming there exists a healthy level of public awareness, and social responsibility.

main exogenous table 1

Report comparing past mass extinction events warns that hunting and killing of ocean's largest species will disrupt ecosystems for millions of years

Adam Vaughan

@adamvaughan_uk

Wed 14 Sep 2016 14.00 EDT Last modified on Wed 14 Feb 2018 15.51 EST

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294<https://www.onegreenplanet.org/environment/marine-species-extinction-and-plastic-pollution/>

Palm beach

46

6

6.9a. How does Climate Change fit in? Currently our civilization is running on fossil fuel which is disturbing how the atmospheric system functions that in return is disturbing the Human System that is not understanding the Atmospheric feedback message to us: **Stop the Burning!**, This situation is occurring because we humans are having difficulty understanding the non-human components of its cause and effect chain. The components that we can sense are only those that do exist within our own knowledge base. It has both an human cause and an atmospheric cause, that is, the apparently exogenous climate-change side effect's of endogenous disturbances of humans burning existing carbon biofuel and fossil fuel during of course the human development, is the fact that we are creating our own disturbances to the Planet. The National Centers for Environmental Information (NCEI) is the Nation's Scorekeeper in terms of addressing severe weather and climate events in their historical perspective. As part of its responsibility of monitoring and assessing the climate, NCEI tracks and evaluates v in the U.S. and globally that have great economic and societal impacts. NCEI is frequently called upon to provide summaries of global and U.S. temperature and precipitation trends, extremes, and comparisons in their historical perspective. Found here are the weather and climate events that have had the greatest economic impact from 1980 to 2019. The U.S. has sustained 246 weather and climate disasters since 1980 where overall damages/costs reached or exceeded \$1 billion (including CPI adjustment to 2019). The total cost of these 246 events exceeds \$1.6 trillion. This report quantifies the loss from numerous weather and climate disasters including: tropical cyclones, floods, droughts / heat waves, severe local

storms (e.g., tornado, hail, straight-line wind damage), wildfires, crop freeze events and winter storms. These loss estimates reflect direct effects of weather and climate events (

6.8 Geo-paleontologists explain epochs The scientists with the volcano theory – at University of Colorado Boulder^{fn} with co-authors at the National Center for Atmospheric Research (NCAR) and other **organizations – have evidence for volcanic eruptions?** These crises are impinging impinge on the attributes of Human Capital as major disturbances, and. they posing the risk of an Are We Entering the Anthropocene? unthinkable global collapse [depending how one thinks]. Many of us hesitate to accept this potential reality of

At this time last year, the biggest corn-producing states in the U.S. had planted 90% of their acreage. This year, roughly 60% has been planted.

Page Page Page **Overarching hypotheses**

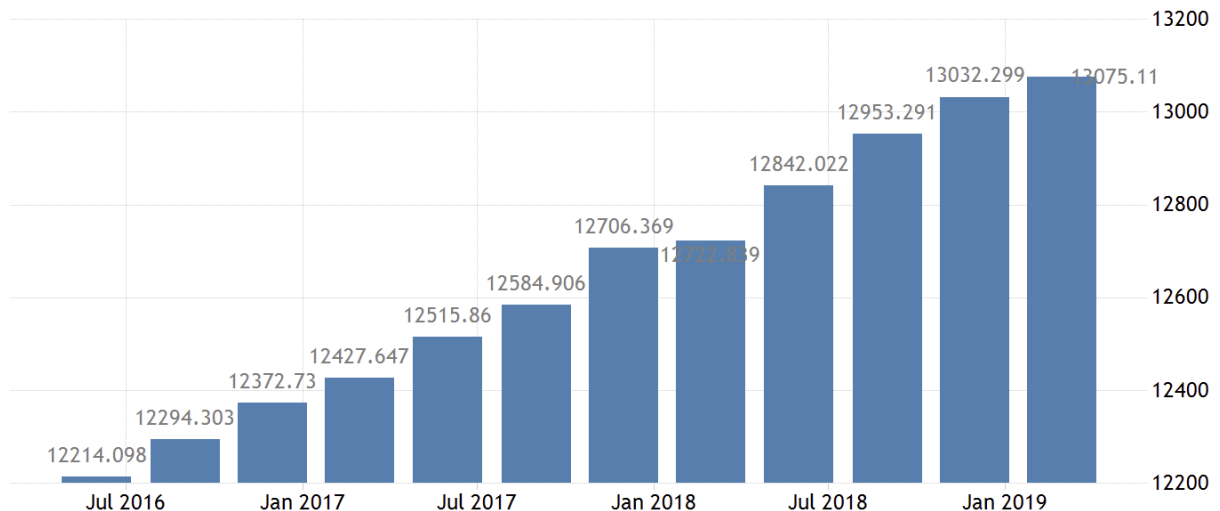
The proposed study seeks to determine why the resilience of estuarine systems varies so greatly when exposed to multiple types and combinations of stress (Cloern 2001). We propose to address this question by testing the following hypotheses: 1) Disturbances can result in structural and even functional reorganization in a system (Fig. 1); 2) Changes in the structure and function of system components will be similar; 3) Functional resilience will decrease with increased number, magnitude, frequency, and duration of disturbances or stress; 4) Disturbances and stressors may act in a multiplicative, non-linear (synergistic) manner to decrease functional resilience; 5) Stress reduction may not result in the return of a system to a previous structural or functional state because key interactions are lost; 6) Initially apparent weak interactions may be keystone interactions; 7) As biotic redundancy (a positive function of biodiversity) increases, functional resilience to disturbance increases; 8) Biotic redundancy will decrease with increasing number, magnitude, frequency and duration of disturbances or stress; 9) System sensitivity, resistance, and resilience can be correlated with biotic or abiotic indicators; 10) Stress in natural systems affects the human system through a number of diverse

pathways; and 11) Less resilient ecosystems will lead to lower market and non-market values derived from the ecosystem.

This report quantifies the loss from numerous weather and climate disasters including: tropical cyclones, floods, droughts / heat waves, severe local storms (e.g., tornado, hail, straight-line wind damage), wildfires, crop freeze events and winter storms. These loss estimates reflect direct effects of weather and climate events (

Consumer Spending in the United States increased to 13075.11 USD Billion in the first quarter of 2019 from 13032.30 USD Billion in the fourth

Historical Data API



SOURCE: TRADINGECONOMICS.COM | U.S. BUREAU OF ECONOMIC ANALYSIS

quarter of 2018. Consumer Spending in the United States averaged 5818.18 USD Billion from 1950 until 2019, reaching an all time high of 13075.11 USD Billion in the first quarter of 2019 and a record low of 1403.69 USD Billion in the first quarter of 1950.

Consumer Debt Statistics. The following statistics come from the **Federal Reserve's Consumer Credit G.19** release: Total consumer debt totaled \$3.898 trillion in 2018, a 7.6% increase from last year. Average consumer debt per capita is approximately \$11,880 (total consumer debt/total US population as of July 4, 2018). Total revolving consumer debt was \$1.039 trillion in 2018.

<https://tradingeconomics.com/united-states/government-debt-to-gdp>

6.8d. Promoting Social Self - (Cooperation or Competition).

cause ent h it affects life and absorb of waste heat back to the atmosphere in form of infrared radiation The The earth's surface warming occurs because a portion of the escaping radiant heat cannot escape and is reflected back down the atmosphere because the GH gasses block and reflect some of out radiant heat, which dismays the natural.gas geological stored stored in the its core, mantle helps heat of the earth's surface that otherwise would pass through surface and lost to the ocean, atmosphere, and beyond. The Climate-warming process is generated because the green house gasses block the infrared radiation is not transparent to the radiation due to Green House Gasses because various substances_ absorb and reflect back to the earth where it escapes or recycles back to the adds more heat to the surface and gains ;heat, and more trying to escape through the GH gasses out, etc). This climate-change process is a major disturbance that if it continues forces the atmosphere to reorganize (Climate Change), which then causes the marine, terrestrial, and human systems to reorganize causes also. This development is of magnitude as to be a proposed epoch dating from the commencement of significant human impact on the Earth's, Terrestrial, Marine, Atmospheric, and Human Systems, including Climate Change and those who driving it. As of August 2016, neither the International Commission on Stratigraphy nor the International Union of Geological Sciences (wqs had not officially approved the term as a recognized subdivision of geological time,[3][6][7the International Commission on Stratigraphy (ICS), voted to proceed towards

a formal golden spike (GSSP) prThe most recent period of the Anthropocene has been referred to by several authors as the Great Acceleration during which the socioeconomic and earth system trends are increasing dramatically, especially after the Second World War. For instance, the Geological Society termed the year 1945 as The Great Acceleration.[9]

It is important information in how a democratic constituency responds rationally and emotionally to disruptions of their social environment and in their expressions of how their needs are being curtailed or violated. effects that inhibit the satisfaction of the community's provision of basic needs. The systems approach necessarily would regard Social Capital of a community as a complex system composed of living and material components that has the function to provide liveable conditions to its inhabitants, and that has have sufficient resilience to remain stable under most external and internal disturbances. This requires a workable degree of mutualism that maintains among its constituency a sufficient level of cooperation, social responsibility, and commitment towards a shared goal of wellbeing. In order to evaluate deleterious malfunctions in the livability of a Social Capital system, one can identify damaged social market-components, human emotional responses to the damage, and how the loss might be replaced or compensated for. However, the non-market social components ,which cannot be repaired by money, need social attention, which in a marginalised neighborhood may hard to find. The fact that prolonged damage, neglect, or deprivation a neighbourhood can lead to personal or community pathologies create a burdensome social debt.

Both humans and other life are self-reproducing and are subject to the slow process of biological evolution. to survive and to to slow changes in their biospheric niche. These slow adaptations are genetic and effectively they allow them to self-correct to improve their species' resiliance in their ecosystem. . Humans have a much greater consciousness that allows them to control their behavior including their interactions with Natural-Capital Components, for good, bad or mutualistic .Modern Democratic governance allows its society to assume the responsibility for caring and controlling Natural Capital within certain limits, which are turning out to be mostly destructive; that is, more for beneficial for economy than for preservation..

The governmental check on this abusive situation is left to the social responsibility of the public to protest and seek legal restrictions on abusive use of natural capital which is often a difficult debate between the value of consuming or conserving the particular component of natural capital in question. Note, such cost-benefit evaluations are rarely done fairly.(see)

The variability of these factors promotes a similar variability in influencing cultural development., for good or for bad . .Hence, we have a caveat:that: If humans want to survive the endogenous disturbances that they create, they will have to adapt to continuously destructive changes to their societies and environment, or stop its cause and adjust to the resulting damages. In this context of Climate Change, it is unique because it is an exogenous disturbance that is being created endogenously. by an exogenous cause. That is, we can reduce the greenhouse gas emissions, but we cannot necessarily fix much of the damage already done or that still being created after the emissions return to normal. As mentioned elsewhere in this book, our culture and environment are complex systems, ,which like the Humpty Dumpty issue, and require complex solutions, that never replicate the original state. Evolution thrives on disturbances because with the right amount of energy they reorganize what they have disturbed to a more stable state (order out of chaos), unlike the case poor Humpy Dumpty while siting on the great wall had a great fall and' all the kings men and horses could't find the energy and the plan to put him back together again'

4. and confused between a competitive growth goal and a cooperative sustainable gl

social democracy wiki

"

6.9. A Focus on World Views (Education and Consciousness

We must not be silly and ask? .What's the Problem about loosing a bunch of worms, pesky insects, ugly weeds, and scroungy animals, anyway we would be better without them? We know better that, if they are alive, they have existential value to balance of the life system they are in. Personally, I find this easy to forget this when a mosquito bites me or the neighbor's dog chooses my lawn for is special duty.

Voting is ultimately controlled by the voter's personal often a slow process world View. and life needs. with the caveat that if the majority of World Views fail to fulfill the populations' needs, strife and civil conflict will break down and fall into civic disorder and degenerating life support.

Figure.19

Figure 21.https://www.pbs.org/wgbh/evolution/library/03/2/l_032_04.html

The aerial photograph on the left shows the Transamazonian highway just after completion. The satellite photograph on the right shows a much larger area, revealing the wake of destruction fanning out from either side of the highway. Large deforested areas, resembling perpendicular stitches along the "scar" of the highway, have been cleared by farmers.

Credits: Photographs from Diversity and the Tropical Rain Forest by John Terborgh. Copyright © 1992 by W.H. Freeman and Company. Used with permission. Graph from Biology: The Dynamics of Life by Alton Biggs, et al. Copyright © 1991 by Merrill Publish

creation .com

the materialist Deliema consciousness is not an emergent property of mater
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Since then, I have brought up this issue time and time again in discussions with skeptics and atheists. Once in a while, you will find someone who is willing to bite the bullet and face up to the stark reality that there can be no truly free choices in a materialistic universe²; however, I have found that to be the exception to the general rule that most people, including atheists, are

highly resistant to the idea that we have no ability to make genuine choices. It runs contrary to our deepest intuitions about ourselves. It also leads to an uncomfortable question: if I didn't freely choose to believe what I now believe, then how can I claim I am being 'rational'? The concept of rationality (making 'good choices' about what to believe based on principles of logic) becomes moot and meaningless if we have no ability to freely make choices or have free thoughts in the first place!

SOURCE: U.S. Department of Education, National Center for Education Statistics. (2019). Digest of Education Statistics, 2017 (NCES 2018-070), Chapter 3.

<https://www.conserve-energy-future.com/various-waste-disposal-problems-and-solutions.php>

[https://www.nationalservice.gov/programs/amicorps/what-amicorps](https://www.nationalservice.gov/programs/americorps/what-amicorps)

Mirian Masaquiza, Secretariat of the Permanent Forum on Indigenous Issues,
tel: 917.367.6006,
e-mail: IndigenousPermanentForum@un.org

A rather poignant exception is that of the Greek islands, when in 500 BC, Plato observed that: "What now remains compared with what then existed is like the skeleton of a sick man, all the fat and soft earth having wasted away, and only the bare framework of the land being left".

Cultures

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sahara <https://www.sciencedirect.com/science/article/pii/S0277379114002728#fig4>

Younger Dryas. Climate has been fairly stable over the Holocene. Ice core records show that before the Holocene there was global warming after the end of the last ice age and cooling periods, but climate changes became more regional at the start of the Younger Dryas. During the transition from last glacial to holocene, the Huelmo/Mascardi Cold Reversal in the Southern Hemisphere began before the Younger Dryas, and the maximum warmth flowed south to north from 11,000 to 7,000 years ago. It appears that this was influenced by the residual glacial ice remaining in the Northern Hemisphere until the later date.

Read more : <http://www.geologypage.com/2014/05/holocene-epoch.html#ixzz661Tsz8Ly>

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Animal and plant life have not evolved much during the relatively short Holocene, but there have been major shifts in the distributions of plants and animals. A number of large animals including mammoths and mastodons, saber-toothed cats like Smilodon and Homotherium, and giant sloths disappeared in the late Pleistocene and early Holocene—especially in North America, where animals that survived elsewhere (including horses and camels) became extinct. This extinction of American megafauna has been explained as caused by the arrival of the ancestors of merindians; though most scientists assert that climatic change also contributed. In addition, a discredited bolide impact over North America which was hypothesized to have triggered the Younger Dryas.

Read more : <http://www.geologypage.com/2014/05/holocene-epoch.html#ixzz661VIwn5P>

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