

Chapter 7

ECONOMY, SOCIAL CAPITAL

HUMAN PREDICAMENT IN LOGIC COUPLETS

- No significant Natural System has remained unaltered by Human Activity.
- Nothing in our Life [except sunlight] comes from outside the Ecosphere.

Two Conclusions

The Ecosphere is our only Support System.
The Ecosphere must be preserved for our Future Civilization.

Two Causes

- Our Economic System is creating destabilizing Social Inequalities.
- Our increasing Population is rapidly consuming our Support System.

Two Consequences

- The Ratio of Resources/Wealth per person is decreasing exponentially and our resource loss is becoming

Chapter 7

Growth Sequence that might help Human Society Evolve?

7.1a. This section presents an abbreviated discussion on the prospects for the future of our Social Capital, which is obviously beyond the scope of this **article**, but the information in this and other Chapters provide information, actions and concepts that should help as reinforcing evidence towards the ongoing activities and policies related to a comprehensive 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 will efficiently, to help 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 BAU and for SD simply on common sense and on moral prerogative.

7.1b. Is Our Society Gambling for a Better Future? Yes, It is, and with a high risk of losing. Unless our human instinct of hope and for cooperation 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^{fn.} But this acceptance hasn't happened yet!!

7.1c. "Ah ,there is the rub!" Is it the lack of comprehension and a hesitant will to change? We should heed 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." With a lack of comprehension, abstract threats, whether true or not act as a threat amplifier that feeds panic and wrong responses. If responding to a proposed major change appears too difficult, a burden, or unnecessary it is likely to lose its

priority status.. Response to an abstract threats tend to be skeptical or false, as with Climate ..Deniers (see Chap. 2.3). But if one believes it is true having heard second hand from someone one doesn't know is foreign and difficult that something is false but attractive becomes quickly accepted and difficult to reverse until its truth reaches a threshold level of comprehension, after which acceptance of its truth can grow exponentially. The negative aspect of this statement is that sufficient comprehension is not an on-off achievement, instead it depends heavily on an one's education, non-political attitude, job *related biases*, religious beliefs, peer pressure, etc. to comprehend the rational and urgency sufficiently to decide how to vote on and issue. For issues involving sustainability both the issue and its solution are subjected to through a bottom up .process and with multidisciplinary, coordination. This type approach could exist, but is not possible with the current US administration's ^{fn}. lack of political will that seriously obstructs the public's view on Climate Change. According to the Pew Research: "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".

7.1d. Both the public and policy need to have an awareness of each of these mega-threatening Disturbances and the combined impacts, the solutions of which seem to be lost in political uncertainty. Without a boarder understanding of them from appropriate scientific, social, experts, educators, and journalists, the public and politicians will not have the knowhow and conviction needed to action . Certainly the Climate and Energy crises should be known by all and considered as double National Security Issues because of its urgency and complexity that will require a fully multidisciplinary effort to formulate and implement a Crises Avoidance Action Plan that is cooperative, and integrated throughout all active global governing components. Preferably in conjunction with international network (UN) that acts to make available Global problems, solutions, data, simulation models, and monitoring progress through, for examples 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"*.

7.1e. How Often do we Hear about Governing for Sustainability? Not much? One should ask if 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 be a focus 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 Natural

7.1f. Capital because, the public is fully dependent on its healthy function. If these values and 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.

- 1) **7.1f. Meanwhile we continue to allow the negative, social side-effects of these Global Crises that are having a reckless growing season!:**
 - 2) • *The biosphere's capacity is only producing half of its historical production.*
 - 3) • **Extreme weather events are destroying our croplands, cities, and coastal zones.**
 - 4) • **The US is the second highest emitter of greenhouse gases after China.**
 - 5) • **Extreme weather events are destroying our croplands, cities, and coastal zones.**
 - 6) The UN prediction that the world could run-out of food in 10-years for shortages of water, soil, fertilizer.
 - 7) • **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.**
 - 8) • **The global average for ratio GDP/public debt is 60%, for the US it is 104% (Bankrupt).**
 - 9) • **Voter turnout for the US is around 55%, the lowest in the OECD.**
 - 10) • **The US has the third highest inequality among OECD with a Gini Index of 0.45.**
 - 11) • **A Global inequality that increases civil/political conflicts and incites mass migrations.**

- 12) The US has the worst national leader (Trump) for responding to the four global crises of climate, Climate, Energy, Financial, Immigration, and decrease-
- 13) The US example of this decision rests on a poor understanding of the individual and communal benefits offered by the two different political ideologies.
- 14) This ideological impasse poses the question of: should the power go to an oligarchy or to the people? If queried, the overwhelming answer would certainly be the latter. A transition, for either case, would involve a major cultural transformation that the public would have to adjust to and accept.
- 15) The BAU approach will do little or nothing about these crises, because it is working against us! In confronting our major threats will rely on a Fix-it here, Fix-it there approach with Adaptive measures that strive to patch up constantly worsening conditions.

7.f One might use an Holistic Systems Approach, (Sect.6.8) below) 'but will also need some immediate Adaptive and Mitigative measures as it generates the essential Preventive measures which reduce carbon emissions and increase its carbon sinks, in order to bring the carbon budgets to a balance that would help the atmosphere and ocean to stabilize at acceptable limits. The reduction of these emissions should provide a 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.. However without a common alternative goal for our societies, such as that of Sustainability, continuing the BAU approach will continue to usurp power over resources, material and environmental; and it would increase social inequality by continuing to encourage exploitation of Natural Capital for profit. Whereas, pursuing the non-political goal of Sustainable Development, policies would be vetted for being *sustainable-at periodic-with check points check-points* that can serve as a guiding standard for the progress of development for all sectors: individual, governmental, industrial, financial, and public. However, no matter which approach, living with or responding to, major disturbances like Climate Change, for either one will continue to require a difficult cultural transformation; one colored by desperation and the other inspired by hopeful conviction for a better future.

Chapter 8

Will these Functional Crises Transform Human Society

In this section, we explore the possibility and immediacy for large changes in our societies and their potential permanence for the future based on a standard of Sustainable Development by incorporating the best of our and ecological, social, technical, and spiritual knowledge.

8.1a. Are we already in the Anthropocene? Yes., we have no choice A number of geloscientists^{fn} have noted that while major cultural changes are occurring on an increasingly shorter intervals and are accompanied by increasing levels of environmental damage and extinction, as shown in Table 1. Some people tend to have a sense of pride for our technical progress, and for others, it is indicative of becoming an intergenerational global problem. That is, when one's generation's wisdom and knowhow is becomes obsolete or out of date, relative to that of one's replacing generation. It is accelerating the problem at an international level for populations of lesser development with those of advanced development.

8.1b Aspects of traditional education also are 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 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. Fortunately the United Nations 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} Thus, a universal challenge exists, but is dependent on whether or not we willing and able to raise the level of our knowledge-base, attitude, and will, sufficiently enough to rescue and transform our societies to a more stable, sustainable, and democratic structures for managing a global transition to a shared, sustainable planet for human habitation. But first we must realize that the human birthday party is over, the cake is eaten, and all of our toys are broken and can't put us back together again - the **Humpty-Dumpty problem!** are we really generating the risk of major a cultural Disturbance?. Our economic, energy, and other crises plus the lack of global collaboration are putting us at risk

for triggering a collapse disturbance that will arrest our progress on Human Development. Ecologically large disturbances, or a continuing strong stress on a system, leads to its disfunction. Historically the Biosphere has suffered numerous exogenous disturbances in the form of mass extinction and habitat loss leading to transformations the composition of biosphere. The significance of Climate Change is that it is both an endogenous and an exogenous threat! For this reason, our present civilization is causally responsible for the damaging changes occurring in all of the three Earth Systems. Consequently, we humans are the only ones that might be able to change it back to a stable level. This end-state would not be necessarily the same, nor soon, because of the non-linearity of the human system. Even if the Climate issue were not right on our doorstep, we would still expect a severe coalescence of the existing endogenous crises of resource depletion, inequality, nuclear weapon proliferation, not achieving peace, overpopulation, and pandemics.

8.1c While major cultural changes are occurring on an increasingly shorter intervals and are accompanied by increasing levels of environmental damage and extinctions. Some people might have a sense of pride for our technical progress, and others, might foresee as intergenerational global problem. That is, when one's generation's wisdom and knowhow is becomes obsolete or out of date relative to that of one's replacing generation, and become an a problem, and especially at the international level for populations of lesser developed nations compared to those of more advanced development. The world's population growth compared to world's resources is squeezing humanity's basic needs for shelter, food, water and health is migrations, conflicts and diminishing human livability.

8.1d As In the past, overpopulated societies migrated to find another environmental location. If this the location was already inhabited, they would need to leave, fight, or starve. Unfortunately, this cyclical pattern, of foraging for food, or clearing the environment and moving on, is much more damaging than the large grazing animals that eat, plow, and fertilize as they move on. As an aside, free-ranging animals, not given food harvested by humans, do not disturb the atmospheric carbon cycle. However, Human Development through its population growth and its and its relentless damage to the Biosphere is coming back with life-threatening force in its devastating changes to the Biosphere and Atmosphere.

8.1.e In entering the the Holocene, we can expect to have to exogenous disturbances caused by forces outside the control of the Human System but causing damaging internal impacts, These occur with, for example with:

- 1) The terra-sphere with its surface geology by (volcanic explosions, earthquakes, continental drift, sub-marine sea level change.,

2) The oceans with its, chemistry, temperature, fish production, sea level, circulation patterns)

3) The atmosphere with its chemistry, temperature, and circulation patterns, and hurricanes)..

4) The biosphere with its extinctions, habitat changes, reduced bio-production.

The Holocene has been identified with the current interglacial warm period. Scientists argue that human impacts on all three of the planet's systems are being destabilized by the growing human disturbances of the atmospheric and oceanic chemistry, and of the bio-extinctions caused by human interactions with the Biosphere on 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 of significant human impact circa 40 Ky

s

6.9cf . Other exogenous events.These occur a longer time scale is marked by major disturbances. Our current epoch is the Scientists with the volcano theory – at University of Colorado Boulder^{fn}

have evidence for volcanic eruptions?These crises are impinging impinge on the attributes of Human s as major disturbances, and. they posing the risk of a potential devastating global collapse [depending how one thinks]. Many of us find it hard to accept this potential reality.

Human systems evolved slowly in response to emergent proprieties.in behavior and in inventive capabilities to develop, enrich, or destroy their availability of environmental resources. Consequently their relationship between nature and humans was largely predatory on the biosphere and on themselves.

6.8d. What is Human Development and how had it Devastated the Biosphere? Human Development (HD) see Sect. 6) is an independent academic discipline that researches and contributes to individuals, families, and societies ' healthy development over a lifespan over the spectrum of changing social conditions. .The term Human Development (HD) is an independent academic discipline which contributes to individuals' and families' healthy development over the lifespan in changing social contexts. The origin of the discipline goes back to 1882 US Act which dealt with the transition from an agricultural to industrial society.It became a discipline in US universities, and was revived by the UN as an index (HDI) to measure similar transitions developing. As humans evolved over their development cycle they gradually shed their former

mutualistic relationship that changed to a mostly predatory relationship. Human Development (HD -see Sect. 6) is an independent academic discipline that researches and contributes to individuals, families, and societies' healthy development over a lifespan over the spectrum of changing social conditions. The term Human Development (HD) is an independent academic discipline which contributes to individuals' and families' healthy development over the lifespan in changing social contexts. The origin of the discipline goes back to 1882 US Act which dealt with the transition from an agricultural to industrial society. It became a discipline in US universities, and was revived by the UN as an index (HDI) to measure similar transitions developing. As humans evolved over their development cycle they gradually shed their former mutualistic relationship that changed to a mostly predatory relationship. Of course this isn't meant to be a blanket statement, because from the beginning indigenous civilizations to respect for natural resources deteriorated, in a fashion similar to that of human activities the feedback loop exists between the natural systems and the human systems, in the sense that for every action, there is a reaction, or feedback. Mother Nature is saying to Humans: You can use me, but don't abuse me! or If you water the flowers they will smile back. That is, If you change the composition of the atmosphere, you will get floods and droughts for your crops. The feedback warning from Mother Nature is according to simple natural law of feedback loops, that says; if you disturb a stable pendulum it will respond by trying to return it to its original position as gravity and friction slow it back down until it stops.

The historical transformations of human development depended on the access and quality of four natural resources of water, food, shelter, and energy, but when the human demand for these resources grew, so did their impacts on the biosphere and, on its production for human consumption as these were no longer available and the human population would migrate to another environment, where they would have to find another environmental location. If this the location was already inhabited, they would be to leave, fight, or starve. Unfortunately, this cyclical pattern, of foraging for food, or clearing the environment and moving on, is much more damaging than the large grazing animals that eat, plow, and fertilize as they move on. As an aside, free-ranging animals, not given food harvested by humans, do not disturb the atmospheric carbon cycle. However Human Development through its population growth and its and its relentless damage to the Biosphere is coming back with life-threatening force in its devastating changes to the Biosphere and Atmosphere.

Table 1

Examples of the Historic progression Human Disruptions of the Biosphere^{fn}

The following list, mostly from *A. Takács-Sánta, 2004; and others noted. It*

1. **Use of Fire** 25K ya. Fire was used as a biomass energy-source for; heating, clearing of vegetation for agriculture, defense or offense against enemies, cooking for extending diet, as disinfectant that increased lifetimes, and in producing other tools and conveniences.
2. **Use of Language**, 40K ya.the use of Language and writing and art enabled the Communication of abstract concepts, Cooperation, Expansion, Trade, and Transmission of Knowledge, Skills and Tools that allowed for collaborative hunting, fishing with nets and other cooperative activities, in particular, that of nurturing their offspring. Although these activities impacted their local environments they provided an understanding of the ecosystem that defined their niche. The knowledge learned with these activities provided a platform and learning for their cultural development which led to the use of **Writing**.
3. **Agriculture**, 10,500 ya. Occupying lands for food facilitated the population growth allowed or a more sedentary life style and more time for women to be with their infants than when they carried their infant in the hunter-gather lifestyle., Domestication of animals and use of the plow reduced laborer required for farming allowed the population too 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.
4. **Civilizations (States)**. 5,000 ya. As agriculture practices grew sufficiently to accommodate higher populations the cities grew in to large urban centers which protected their agricultural lands until they were unable to sustain them. Population growth needed greater appropriation natural resources , which caused and extinctions, social inequality, domestication of animals, mechanized tools to save human labor and means of travel, and irrigation,

Because human development has depended heavily on the earth's resources that appeared infinite relative to early populations, concerns for their preservation nor for the concept of extinction apparently did not enter into the consciousness of man. A rather ironic 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 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} some of the best examples being in the Camargue of southern, France and on the peninsula of Mt. Athos in Greece (protected by its famous monastery.

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

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.

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

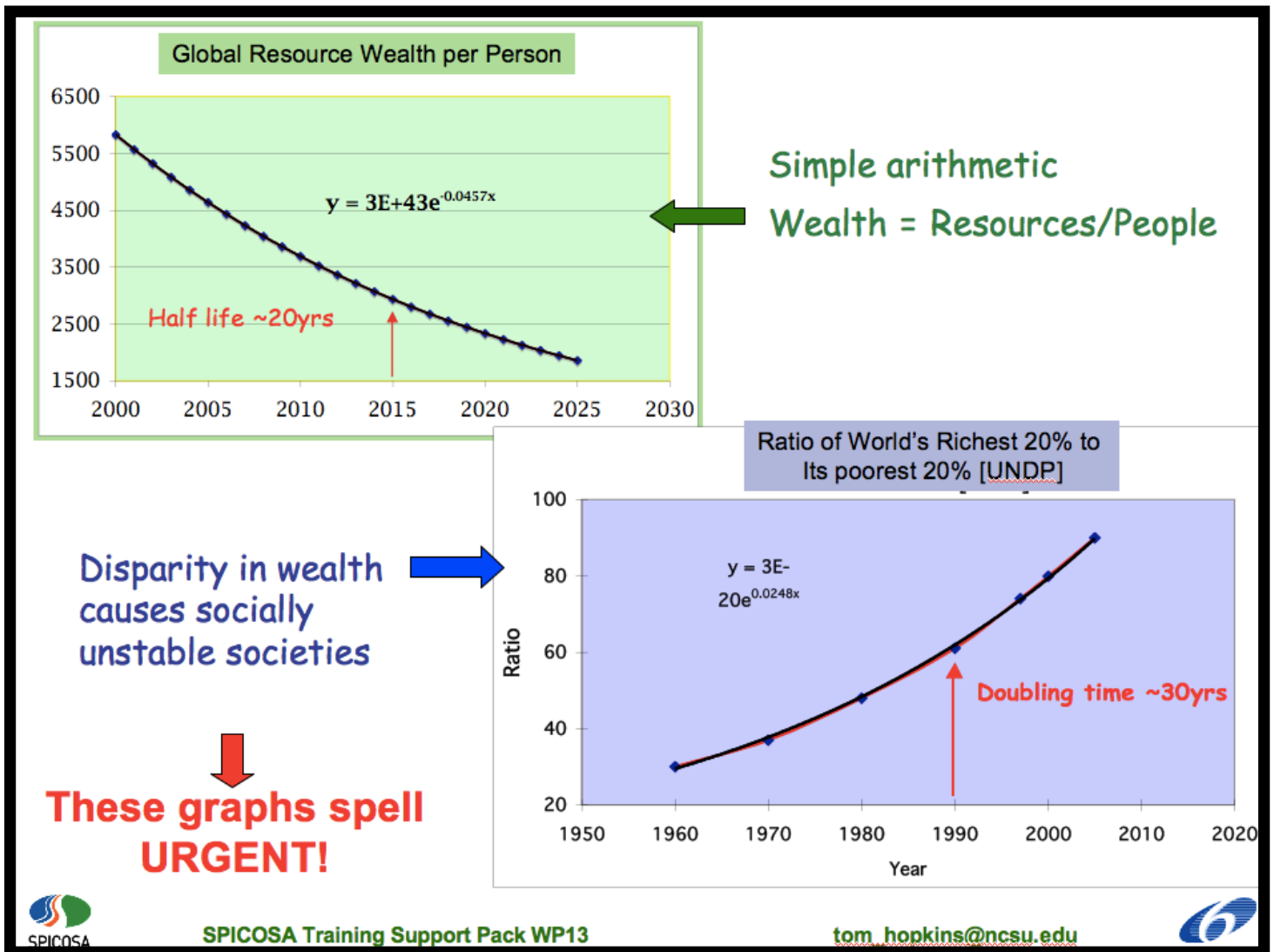
7. Information Revolution

I.

sudden external disturbance, as the KT asteroid during the cretaceous epoch 66 million years ago caused a mass extinction of an estimated 83% of life..

“the Great Leap forward for Human Evolution

..
get book J. Donald Hughes's excellent book, Ecology for Ancient Civilizations (University of New Mexico Press, Albuquerque, 1975). For more on Mediterranean ecology, deforestation, and population growth rates, see Ecoscience: Population, Resources, Environment by Paul R. Ehrlich, Anne H. Ehrlich, and John P. Holdren.



6.9

Table 2

-By no means complete—source, Reka H. Banathy 1985

Examples of Human Development that Transformed our Cultures.

forceful

6.8d. .Will a Systems Perspective Help us Understand? An unwritten feedback loop exists between the natural systems and the human systems, in the sense that for every action, there is a reaction, or feedback. Mother Nature is saying to Humans: You can use me, but don't abuse me! or If you water the flowers they will smile back.If you change the .composition of the atmosphere, you will get floods and droughts for your crops. '.The feedback warning from Mother Nature is according to simple natural law of feed-back loops, that says; if you disturb a stable pendulum it will respond by trying to return it to its original position as gravity and friction slow it back down on until it stops. Similarly, if a complex system is disturbed internally, it also will disturb the function of the components connected to it, and likewise diminish the resilience of its chain of connected internal components, whose functions play a critical role in the System's function. The lessons we are learning from Mother Nature, are that we, the human system, must learn is to live within the resilience limits of the many critical components of the planet's Terrestrial, Marine, Atmospheric, Systems that we humans abuse by harvesting, polluting, and occupying,. and

which is our indispensable support system. Regretfully, we have known this from the Seventies and don't have much time to correct it, as shown in **Figure. 21**.

The Systems Approach is effective in diagnosing complex disturbances, which involves using our scientific knowledge to understand the healthy status and its normal function, and the linkages of the components in the the linkage between the causal component and those of of the disturbed effects. Next we identify the dysfunctional components that of the problem in 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 to seriously cut/stop mining fossil fuel and use our current oil-coal reserves while accelerate the electrification the transportation and utility sectors.

Regaining a stable functionality for a Human 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 resilience fails or persists long enough that the connected components create a degradation-chain components until the disturbance stops. If the disturbance continues, it passes the shock on to its connected components in creating a of weakening chain of affected components and thereby loosing some or all of their function until, the eventually, the System collapses. Understanding the existence of this complex chain from its first alert, is crucial to maintaining stability. Obviously, each of the chain components also have a resistance-threshold (tipping points), which if a shock is not absorbed, 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 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 it was, exposed.. 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

A good example of adaptation is that of the Tibetans who are renown for their high-altitude adaptation for their ability to live in the high Himalayas under low oxygen condition. Professor Rasmus Nielsen, UC Berkeley, found that by comparing the genes “have compared genes between the Han and the Tibetan population who descended from the Han and at much lower populations and looked at specific genes responsible for high-altitude adaptation in Tibetans. "By identifying genes with mutations that are very common in Tibetans, but very rare in lowland populations we can identify genes that have been under natural selection in the Tibetan population," said who took part in the study. "We found a list of 20 genes showing evidence for selection in Tibet but one stood out: EPAS1. The gene, which codes for a protein involved in responding to falling oxygen levels and is associated with improved athletic performance in endurance athletes, seems to be the key to Tibetan adaptation to life at high altitude. A mutation in the gene that is thought to affect red blood cell production was present in only 9% of the Han population, but was found in 87% of the Tibetan population”

A gene that controls red blood cell production evolved quickly to enable Tibetans to tolerate high altitudes, a study suggests. The finding could lead researchers to new genes controlling oxygen metabolism in the body. An international team of researchers compared the DNA of 50 Tibetans with that of 40 Han Chinese and found 34 mutations that have become more common in Tibetans in the 2,750 years since the populations split. More than half of these changes are related to oxygen metabolism.

For us lowlanders t

time scale is irrelevant on a human time scale, of course, but we do need to be concerned about decreasing atmospheric oxygen

How does climate change fit in? Currently our civilization is running on fossil fuel and not attending to the feed back message from the atmosphere, in great part because we humans can't understand the repercussions of its cause and effect chain, being a real abiotic-

Endogenous Disturbances? Center for Atmospheric Research (NCAR) and other organizations – have evidence for volca

.

Current CC MD,NW, EN,FO,PO

what about exogenous

Based on the Energy Information Agency's models (EIA), the Oil Industry forecast that US's shale-oil boom will probably peak circa 2019-2030 at 18 mb/d and would tail off unless to ~2029 (UPI) -- Production of the so-called shale, or tight oil, will continue to increase

through 2030 and reach more than 10 million barrels per day in the early 2030s, the Energy Information Administration said.

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 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.

for example in geological time a

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

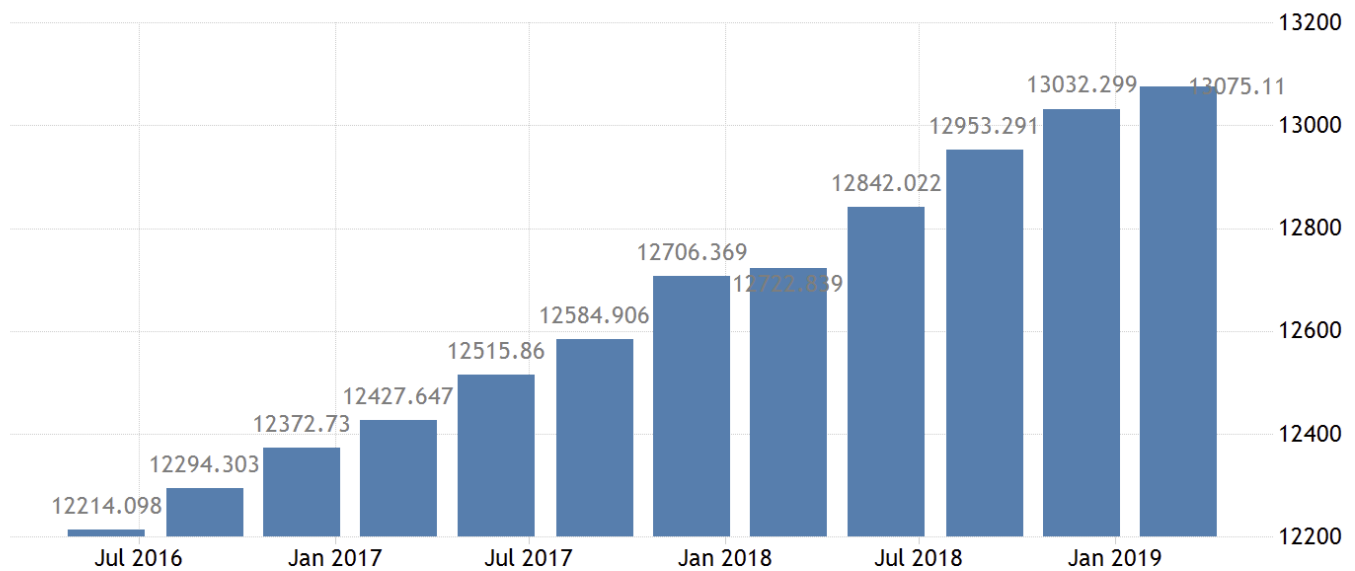
effects of weather and climate events (

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 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>

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



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

climate events 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 (

Anthropocene 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, sedentary cultures, and the use biofuel for fire”.This agricultural transformation of 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 political, 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 of squandering usages of this cheap energy. The interglacial periods last from 10 to 30 thousand years, rather suggests warm climate for several more thousand years, without other major events. For example, like the unusual volcanic activity of 50-year-long episode of four massive tropical volcanic eruptions, between 1275 and 1300 A.D that filled the the northern atmosphere with volcanic dust and shaded the sunlight and triggering the Little Ice Age in the northern hemisphere for another another series of major volcanic activity that would cool (shade) the atmosphere) similar to that which is believed to have created the little Ice Age

ddafaa

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 disarms 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 (IUGS) had not officially approved the term as a recognized subdivision of geological time,[3][6][7] the International Commission on Stratigraphy (ICS), voted to proceed towards a formal golden spike (GSSP) period. The 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 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, their 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 slow changes in their biospheric niche... These slow adaptations are genetic and effectively they allow them to self-correct to save their species. 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 unfortunately are mostly destructive, more for the economy than for conservation. 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 to 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 a 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'

8d. Promoting Social Self - (Cooperation or Competition).

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

6.9. A Focus on World Views (Education and Consciousness).

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.

3.5. each of these breed conflicting World Views that cause a zig-zag in our support of policies and practices in governance.

/Why is one's World View important for a functioning Democracy?

8d. Promoting Social Self - (Cooperation or Competition).

6.8. A Methodology for Human Scale Development

6.8a Background. Human Scale Development was created in response to traditional hierarchical development systems in which decisions start at the top and flow down instead of in a democratic manner. Max-Neef's theory of fundamental human needs forms the basis for the creation of an alternative bottom-up approach to human development. His hypothesis is "that the best development process will be one that enables improvement in people's quality of life; one that must allow countries and cultures to be able to be self-coherent" (Max-Neef 1998a). He uses a "participatory platform for development by the people and for the people in order to fulfill the fundamental human needs, increase self-reliance, and balance the of people with surroundings. The satisfaction of fundamental human needs and the generation of growing levels of self-reliance; and in the construction of the organic articulations of people with nature and technology, of global processes with local activity, of the personal with the social, of planning with autonomy, and of civil society with the State" (Max-Neef 1992b, 197).

Max-Neef¹ has developed a more systematic approach to evaluating Social Capital other than that of trying to integrate an assessment of responses to different specific issues. Surveying a response to a specific community or SC component will not provide enough information to formulate a solution, unless its dependences on other SC internal and external components are taken into account. That is because of the complexity of SC communities that have numerous connections between its components such that any given individual at any moment is sensitive to and influenced by other components. By treating a Social Capital as a complex system and using the System Approach*to achieve stability among a human population constrained to a liveable balance between what it needs and what is available, and how they are internally distributed. Such a condition provides and objective goal: that is, by comparing the lack of quality and functionality expressed by a community with a well function SC community. The needs are relatively constant compared

to a consensus condition of what they feel would be a satisfactory distribution. The approach then is to evaluate the difference between the needs of a community and what it needs to satisfy them taking into account the complex interactions between the needs. From this difference one can analyze how interactions between satisfiers can form positive or negative synergisms and thereby suggest more effective policies. deficit requires as a complex system that to achieve stability among its human population must be constrained to a liveable balance between what it needs and what is available, and how they are distributed. The basic needs are relatively constant compared to the availability and the distribution of wants “Satisfiers” (or what people think would make them happier). satisfiers of needs. Max Need then suggests a bottom-up economy should focus on satisfying the public’s fundamental needs instead of what the market and policy decides is the most profitable and convenient to offer.

This approach also differs from the conventional top-down policy approaches that focus on fixing undesirable impacts to the public’s social capital after they have happened and the causal links are blurred. Since the needs of a social capital population represent a complex subsystem of interwoven needs and satisfiers, simple policies focused on a single problem, such as poverty, hunger, crime, and so forth, are commonly unsuccessful. For this reason Max Neef proposes a more thorough systematic approach. Hence, he proposes a methodology that demonstrate: what is the structure and intensity of a community’s basic needs, what governance might satisfy them, and how a policy framework might be designed to synergistically satisfy these needs. Essentially, his approach presumes that individuals require an essential certain set of conditions to exist (existential needs) and a supplemental set of conditions to contribute to enjoy and contribute to the society they live in. A summary explanation of the methodological framework is given in the following paragraphs:

6.8b Causal Relationships with a Systems Approach. The information from the above trends (Sect. 5.5) can help us evaluate our social progress by measuring certain critical issues pertaining to specific components of Social Capital that are changing within a population, but not necessarily the causes of these changes. This is because an external action may create many responses (in a complex system), which makes it difficult to surmise the cause from any incomplete set of responses. For example, we do see a strong correlation between economic and social inequality, particularly for those social components directly connected to the market, but we understand less how that correlation breeds side effects that can perpetrate and dominate the other social components. To do this one needs a more complete understanding the cause-and-effect chain between a public policy, the issues it creates, and the individual responses to that issue, in order to

facilitate policy modifications focused towards better social capital instead of towards social deterioration and chaos.

These are the very questions that a Systems Approach² (SA) uses to better understand how one misguided policy in a complex system can propagate internally to other components. The Social Capital (or Human System) has only one external input provided by the Natural Capital and many internal connections between Social Capital components Financial, Industrial, Agricultural, Economic Governmental, Cultural, and Resource-Yield systems that are human constructs that interact with each other and are internally distributed (distribution system) to meet the needs of its component systems (nations, regions, cities, individuals). If the internal distribution function is inefficient, or erratic, such that the minimum requirements of its components' needs are not satisfied the stability of the system is sacrificed and manifested by internal strife, conflicts, and emigration. If this condition persists, the system will reorganize to a higher entropic level of inequality.

The Systems' Approach presumes that for complex systems a cause-and-effect chain is not reversible, in the sense that by repairing the effect (impact) the original cause will not be eliminated. For example, a single energetic input (material or political) to a complex system spreads internally to many sub-components of a complex system and creates a Humpty-Dumpty effect of side effects, which cannot then be resurrected and return the system to its pre-disturbance state. For example, a single policy action to fix one problem can have many collateral impacts, and unless the internal functionality is well understood, a linear connection between the system's responses will not reveal the cause of the targeted impact, because the links in the cause-and-effect chain will have changed. Hence, any energetic input to a complex system can cause multiple and diverse outcomes other than the outcome intended.

Consequently without knowing the functionality of the internal components of the cause-and-effect chain activated by a wrong or inept policy, one cannot answer why people are responding to a policy simply by measuring the subject responses to it. For the same reason by removing the policy action, the affected components will not necessarily return to their previous states. In the case of measuring the policy effectiveness, to promote changes in social capital, is made difficult for several reasons, because of its subjective and interconnected nature, of the uncertainty of how in the cause-and-effect chain should a policy be actualized, and of what will be the human behavioral response to this policy change. In short, social problems cannot be remediated by one dimensional, top -down

policy. The problem is that most social problems inspire policy changes only after they become seriously obvious.

[Max-Neef³ has developed a more systematic approach to evaluating Social Capital other than trying to integrate an assessment of responses to specific issues. This has additional value, because a human community is vastly complex, from the level individual to global point of view, it is impossible but necessary to generalize reactions of any given set of likeminded individuals. However, this same set might much easier agree on the fundamental needs in order to exist, for example food, water, and shelter.]

Nevertheless, a well-designed systems approach that uses validated behavioral norms based on historical data to construct and validate simulation models could help in forecasting impacts to Social Capital. As a case in point, a number of Tax models exist⁴, but they extend only to the microeconomics of tax payers financial portfolios, such as shifts in portfolio holdings, shifts in consumption, and tax planning and tax avoidance strategies.

6.8c Subjectivity. How people feel about their social environment is subjective and is often measured, as above, by happiness or wellbeing of their situation that are often sensitive to their immediate condition of stress, whereas measuring the level of satisfaction conveys a slightly broader sense of being able to fulfill one's life-needs and expectations, and likely better measure of satisfaction with the current social conditions.

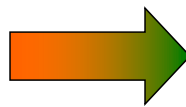
In the sense of a cause and effect, where the 'causes' are generated by external disturbances that we impose on a human community, such as policy changes or natural disasters. The internal effects are the public's stress-responses to these disturbances, which we cannot easily be repaired by simply replacing parts and that inhibit community's sense of well being. Nevertheless, it is important to consider information on how a constituency responds rationally and emotionally to disruptions of their social environment and on how their expressions of how their needs are being curtailed or violated. In turn, such subjective effects tend to inhibit the satisfaction of the community's provision of basic needs. For example, the diversity of the community is such that 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, their 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 neighbourhood 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.

The Paradigm Shift of 21st Century

Achieving a balance between Individual and Societal Values

Humans above Nature
 Hierarchical organization
 Niche expansion
 Masculine - exploiting
 Ego-centric



Humans as part of Nature
 Network organizations
 Niche responsibility
 Feminine - nurturing
 Socio-centric

Adding to the way we think about and value our society

Thinking

Values

selfassertive

integrative

selfassertive

integrative

rational
 analysis
 reductionist
 linear

intuitive
 synthesis
 holistic
 nonlinear

expansion
 competition
 quantity
 domination

conservation
 cooperation
 quality
 partnership

SAF is based on this Shift

Fritjof Capra

6.9 The Matrix Definition

6.9a Defining the Needs and Satisfiers. The central concept of Max-Neef's contribution to Human-Scale Development is that the understanding of human needs, and how they are or are not satisfied, is an essential information for generating policies focused on improving the livability of human societies. This understanding requires a distinction between needs and their 'satisfiers'. It is important to recognize that human needs and their satisfiers form two complex subsystems of Social Capital in that they are interrelated, interactive, and that their interactions must be in dynamic balance for their good function and stability. However, the range of variability for needs, is much lower than the range of variability in the satisfiers, which is, in turn, dependent on the variability in the policies, economies, and producers of satisfiers. The logic of a systems approach for the management social stability, necessitates an understanding of a community's needs and of the manner by which they can be satisfied as the starting point for this cause-and-effect chain in order to actualize more efficient and effective policies that ensure social development. These two of Needs and Satisfiers are each classified and described in the following paragraphs:

Four Existential Needs. A criteria for wellbeing and the quality of life depends on a basic set of four inherent actions that are fundamental to satisfying one's basic existence; these are the Existential Needs of Being, Having, Doing, and Interacting. These are critical for a person's survivability and remain so despite the historic exposure of human societies to wide diversity of differing cultural environments. Hence they tend to have a high communality value among human communities.

Nine Axiological Needs. In the process of fulfilling these existential needs for a complex modern society, another set of nine supplemental axiological needs must be considered (cf. Fig. 19). These all relate to one or more of the four basic existential needs. They arise as supplemental common needs incurred by the complexities of living in modern societies. The

first four exogenous or available or imposed externally to the individual and the next five are generated internally within the individual. It is important that all the axiological needs must be defined by the resident population and may vary somewhat in intensity depending on the individual's existential needs but they still remain immutable to changes in time or ambient culture. They represent a quality of life that an individual can identify with and provide a rough measure of its level of intensity, and some descriptor of how it could be fulfilled or satisfied. Thus, any list of satisfiers is dependent on composition the community studied.

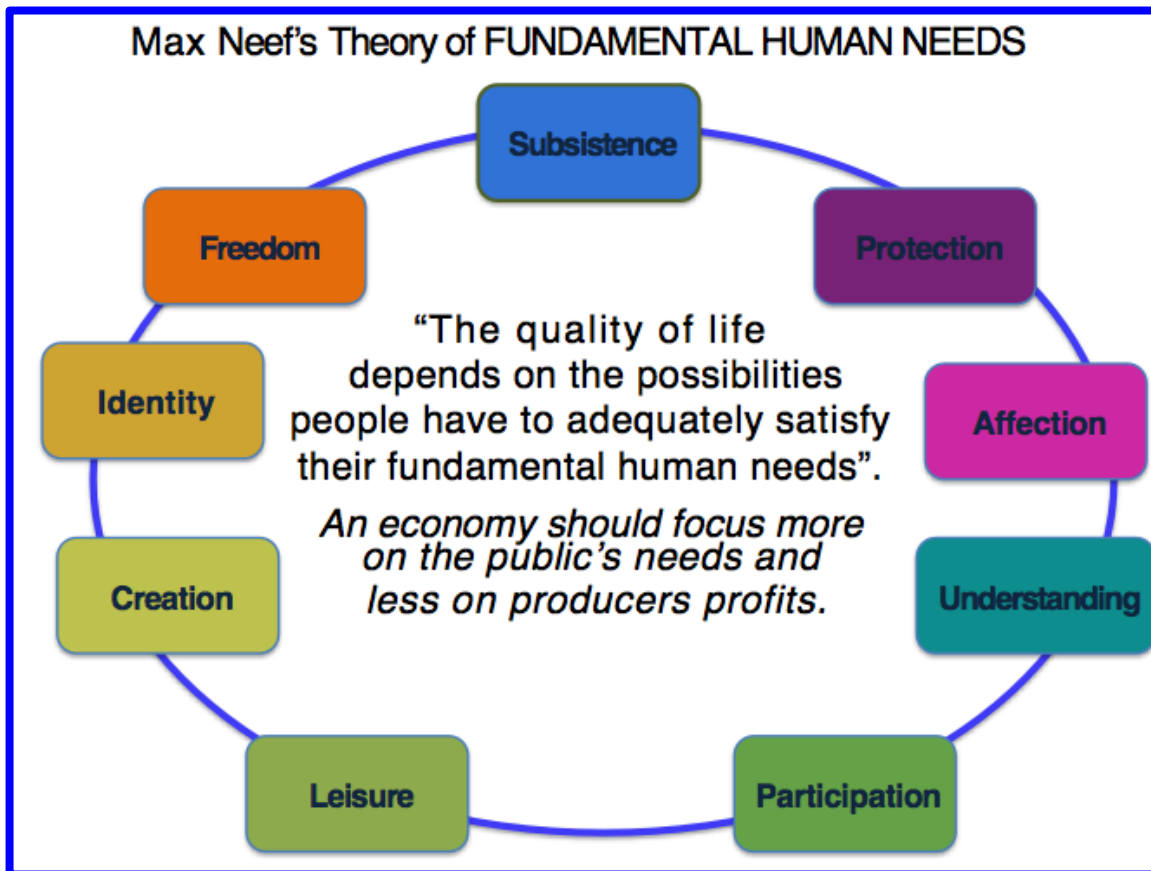


Fig. 19 The Axiological Human Needs. Going counter-clockwise from Subsistence, the first four are exogenous and are imposed or available external to the individual, and the next five are generated internally to the individual. Author generated from Max Neef^{ibid}. **Fig. 19 The Axiological Human Needs.** Going counter-clockwise from Subsistence, the first four are exogenous and are imposed or available external to the individual, and the next five are generated internally to the individual. Author generated from Max Neef^{ibid}.

6.9b. Defining the Satisfiers. The satisfiers for the existential needs are relatively independent between communities, varying mostly in intensity. On the other hand, the

satisfiers of the axiological needs can vary significantly in quality and intensity between communities being dependent on the resident culture and environment. All satisfiers are subject to time variations of their external environment. In addition, the satisfiers of the axiological needs can interact synergistically or conflictual such as to affect the stability of the community, unless an interactive balance between them can be established .

Specific satisfiers are defined according to the manner by which they fulfill the needs of the resident society in the form of descriptors, agents, objects, behaviors, conditions, and so forth. Consequently, exposure to a rapidly changing culture creates a disconnect between the needs and the satisfiers of both developing and developed nations due to internal changes in economies, polices, ways of life, and by external changes wrought by depreciation of Natural Capital. Thus, this disconnect is aggravated by a lag in providing a match between two moving targets: between the erratic changing of satisfiers, and the relatively slowly adjusting of habitual axiological needs.

This predicament generates a system of satisfiers from those that are deemed as successful in fulfilling a need in a positive manner, to those that are deemed to be unsuccessful in the fulfilment the intended need. Diversity in the goods, services, and polices in modern cultures generates a changing set of exogenous satisfiers, that can be identified as positive or negative satisfiers. If the balance of plus-&-minus satisfiers is negative the community becomes vulnerable to SC degradation: and because of the commonality of the Needs is higher than that of Satisfiers can vary significantly in intensity and type between communities. Max-Neef has categorized the satisfiers into types; They briefly described here in abbreviated form and ranked in the sense of best to worst as follows:

Synergistic Satisfiers: These satisfiers focus on satisfying a specific need, while simultaneously stimulating and contributing to the fulfilment of another need(s). They share the attribute of being generated by individuals or free participating groups, and not imposed externally as an obligation or directive. They can be an agent for individual enjoyment or social change, and they point to synergistic policies that generate self-reliance and social responsibility. Examples: Preventive Medicine (Protection), Democracy (Participation), Meditation (Identity).

Singular Satisfiers: These actions intend to satisfy only a particular need but often do satisfy other needs. They are characteristic of constructive programs of assistance, cooperation, and development. These satisfiers are similar in that they are usually institutionalised; that is, their origins are mostly from governmental or private institutions,

NGOs, or form the private volunteer groups. Examples: Food Stamps (Subsistence), Access Curative Medicine (Protection), Hospice Support (Affection), Early Education (Understanding), or Recreation (Leisure).

Inhibiting Satisfiers: These are negative satisfiers that over-satisfy a given need, or can curtail the possibility of satisfying other needs. They are primarily rooted in curative beliefs related to deep-rooted customs, and they can impair all the axiological needs. Examples would be: Poor quality education Education (Understanding), Segregation (Freedom), or Overprotective Parents (Affection).

Pseudo Satisfiers: These are remedies that generate a false sense of satisfaction of a given need. They may on occasion annul the possibility of satisfying the need they were originally aimed at fulfilling. Their main attribute is that they are generally induced through propaganda, false news, or other means of persuasion; and they are mostly aimed at the need of Understanding, but can induce failure in fulfilling any of the axiological needs. Examples: Stereotyping (Identity), Indoctrination (Understanding), or Charity (Subsistence)

Dissatisfiers: These are remedies that, when applied with the intention of satisfying a given need, not only do they annihilate the possibility of its satisfaction over time, but they also impair the adequate satisfaction of other needs. These mostly pertain the positive need of Protection, yet in fact, have the negative effect by making it more difficult to satisfy the need of Freedom, and may impair the satisfiers of other needs. Examples would be: Oppressive National Security (Freedom), Corporatism (Subsistence), or Restricting Voting Rights (Participation).

6.10 The Matrix Method

6.10a The Matrix Method- The value of the Max-Neef matrix is that facilitates the measurement of acceptable limits of livability of a community in a manner that provides guidelines to policies for Human Development and Sustainability. The advantage of first identifying the basic needs is that they are easier to define, more consistent, are of a much more manageable number than the complex array of social responses to them. This multidimensional approach differs in information content from that provided by one-dimensional indexes (Table 1) or their aggregates. These positive trends can be measured by indexes as those of Table 1, which provide necessary validation of specific social progress. Human responses to its social environment are subjectively experienced, and consequently they cannot be directly measured monetarily, but can be measured relatively through extrapolative and comparative studies.

Max Neef proposed a transdisciplinary methodology for diagnosing the interactions between social policies and social needs. The information of the three parameters, of the existential needs, the axiological needs, and their satisfiers, permits the construction of a 3-D matrix that can provide an holistic display the deprivations and potentialities of a community's social capital and shed light on the policy modifications to engender improved public. An example of such a is shown in Fig. 20. Analyses of such a matrix offers diagnostic information for generating curative policies for the fulfillment of exogenous needs and for transformative changes for stronger social responsibility among the population. The value of this methodology is best understood through experiencing its application. Max Neef has given a rather thorough outline of the procedure in his book, Human Development; and Cruz et al. 2009 have elaborated it further. A condensed form follows

. **Fig. 20. Matrix of Needs and Positive Satisfiers.** Examples of satisfiers descriptors are shown in the internal panels located at the intersections of the Existential Needs (horizontal axis) and the Axiological Needs (vertical axis). The axiological needs are differentiated between those imposed internally and those externally. An additional, existential need (Emoting) is inserted to identify the feelings created by those negative Satisfiers that can generate certain social pathologies (see text). In practice, these satisfiers are composed and prioritized using consensus-building methodologies environment are subjectively experienced, and consequently they cannot be directly measured monetarily, but can be measured relatively through extrapolative and comparative studies. complex array of social responses to them.

6.10b Implementation Procedure. The reader can find more complete descriptions of procedure and time allotments for the activities in Max Neef's works ref and descriptions of actual experiments by of Barrera ref

1) Matrix Workshop Organization. The workshop should allow several days and be conducted by a workshop facilitator trained in the methodology and assistants capable of leading a consensus building process. In order to have a bottom-up and a less-subjective process, the basic needs of a community can be understood through a process of having a representative group of citizen volunteers of about 40-60 residents for the workshop. To ensure the transdisciplinary requirement, the participants should be fairly well distributed between citizens experiencing unfulfilled needs and those involved in providing the satisfiers that should be addressing them. Of course, the size of workshop can be modified according to the size of the community served.

2) Plenary Information. The workshop begins with a comprehensive presentation of the concepts, matrix methodology, and goals of the exercise, and discussions of the purpose and of the expected outcomes. Fig. 20 illustrates an example of such a matrix where each grid indicates the satisfiers for its axiological needs in the context of its existential need. It also provides an instructional tool for constructing such matrixes and to serve as a framework for analysis of how the host community functions in terms of its deprivations and potentialities, and of how the community might find synergistic policies for improving community's social capital.

3) Construction a Situational Matrix. This exercise allows the participants look at their community from the point of view of exploring and identifying the needs and satisfiers of their community. The participants divide into round-table groups of around 8 to 10. Each group would have a leader who is familiar with Consensus Building Processes⁵. To serve as an initial exercise a matrix is constructed of the host community by the participants using their perceptions of negative satisfiers relevant to the current situation. This lets the participants look at their community from the point of view of exploring and identifying the needs and satisfiers of their community. Each table-group does this independently of the other tables to further randomize the diversity of impressions. The goal is to select those elements that are inhibiting or degrading the community's wellbeing, and list these by descriptors according to type of satisfier (see below).

Filing-in the Matrix. The recommended procedure for filling in the Matrix is to start with the grid A1 (BEING) column for the existential need with suggested satisfiers that are relevant with the axiological need (Subsistence). Each satisfier must be decided by a consensus of the table participant and should be limited to three. After filling the A column, proceed to fill in the B (HAVING) column and proceeding down the A column to A9. Then using the same procedure for the rest for the three other existential needs until reaching D39. In the adjacent narrow column a ranking number (judgement of satisfier's effectiveness) for each satisfier with 1 to 5, making 3 neutral) for each satisfier as shown in Row 2 of the figure.

Grid Content. Satisfiers are expressed as attributes using nouns for the needs of BEING pertaining to the Subsistence need, as examples shown in Fig.20. This is continued in the same way for the HAVING column expressed as institutions, instruments, norms, using a short phrase, the DOING column expressed, as actions using verbs, and the INTERACTIONS expressed, as social or personal connections, as settings, nature, environment, family, schools, using a short descriptors.

Editing Matrices. Finally, the group should collectively edit their situation Matrix. They should replace any Satisfiers that are roughly synonymous, with a single descriptor. For each axiological need, they should average the ranking given to satisfiers of each axiological need and note the frequency of its mention in the last column. The respective sum of these two numbers indicates its ranking in terms of urgency and importance. After completing the situation matrix, the participants should rep

4) Synthesis Matrix of Negative Satisfier Matrices. These matrices of each Table need to be consolidated to express a synthesis of the worst satisfiers that are not meeting the community's needs. To consolidate them into a consolidated matrix the participants reorganize the participants into nine groups for each of the axiological needs. The goal is to determine for each grid the several 'worst' satisfiers for each existential need and entry into a blank synthesis Matrix. This can be done by amalgamating and listing all the satisfiers from each of the of the table-groups for each of the four grids of their existential need. They then can reach consensus on eliminating the highest ranking ones (three or five), taking in consideration any potential for negative synergistic effects between satisfiers. Switching back to four groups participants candid and cross check the grids by for pertinence to the four existential needs, including the dominant emotions relating to them. The results of the Synthesis Matrix can be presented and discussed and interpreted, plus the associated feelings for the Emotion column that may contribute to a community pathologies, and to what the reveal about the lack of 'good' satisfiers and how they might be changed. .

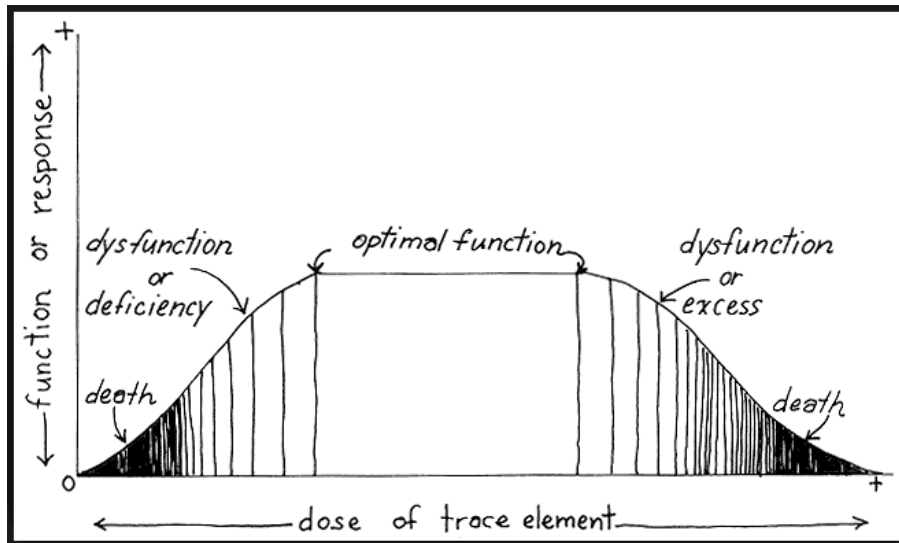
5) Constructing a Propositional Matrix of Satisfiers. The situational and synthesis Matrices demonstrate and clarifies the extent to which the present community is not meeting the citizens needs. This matrix helps validate much of what many citizens already concerned about. However, this information is not useful unless it can guide policy and public behavior. For this reason Max Neef proposed that it should be compared to what the community would like it to be. This requires making a propositional matrix consisting of the practical positive satisfiers that the community would like to have. This can be drafted by a group of volunteers preferably those representing or concerned with the lowest ranking satisfiers, after leaving a short time to allow for reflection, before assembling for constructing a draft Matrix from which they edit to form a synthesis Propositional Matrix. The proposed satisfiers should reviewed and discussed by each of the Tables again using the consensus methodology for each. They should then edit them giving preference to synergistic and single satisfiers in order to optimize the efficiency of the combined set of policy changes that emerge from the exercise.

6) The Situational vs. Propositional Comparison. Comparing the two synthesis matrixes, grid by grid, is a type of editing process to identify priorities and improve policy efficacy and efficiency of policy for the problematic aspects for each axiological and existential needs. Adding the rankings gives a rough gage of effectiveness for each grid. Similarities between a satisfier of two different grids indicates a 'bridging', that offers a potential for synergistic satisfier. Special attention is needed to differentiate and take in to account those satisfiers imposed by external from internal governance internal potential. The satisfiers imposed by the community should be designed to complement or adapt with supplementary positive satisfiers to balance any such negative exogenous satisfiers. The changes in the basic emotions between the two matrixes should be discussed in the sense of generating wellbeing and social responsibility in a community. As noted the value of this exercise is mostly in the participation. Greater detail in the methodology can be found in references - m-n

7) Comments on Value. Evaluations of human behavior in response to designing social capital for a sustainable society, one needs knowledge of how and when external stresses upset the sense of satisfaction so that they can be minimized. Individuals and communities have limits to external stresses within which they can adapt and accept. If these limits are exceeded, they experience evasion or degradation of mood, health, and willingness to cooperate. For example, an individual directly suffering from economic poverty generates other stresses due deprivation of the social aspects including his own condition (e.g. health issues, world view, etc.), and the poverty of one person generates stress for those in the community that are not directly experiencing poverty. This operates similarly to the dose curve (Fig. 36). Either too much, too little, or both can be damaging, e.g. for iodine both are bad: too little for proper thyroid function and too much becomes a deadly poison. The effects of multiple stresses are negatively synergistic and are known to engender personal or communal pathologies that cannot be cured by relieved easily, Social capital needs to provide some balance and systematic corrective actions for these stresses. The financial sector could be important, if it could relieve the web of deprivation in a balanced manner. One might say that trying to fix social inequality with money behaves as a dose curve where, too little and too much are damaging, without understanding the internal functioning of the patient

Fig. 36

Dose curve. The chart portrays the system as a toxic it dose. The benefit middle range deteriorates lethal with levels of the dose⁶



Example of a The chart response of a function of such as iodine. is optimal for a of dose, and to damaging or lower or higher

A similar analysis of planetary boundaries for the community of nations is needed. A striking observation is that the Max-Neef threshold (cf. E.5.3.a) was reached in the 70s-80s when the humanity was passing its carrying capacity and the accumulating financial wealth was no longer making the population happier! This removes the angst that populations cannot live happily at sustainable levels of consumption, of peace, about human freedoms: freedom to realize the full potential of every human life, not just of a few, nor of most, but of all lives in every corner of the world—now and in the future. To ensure human development for everyone, the Report asserts that merely identifying the nature of and the reasons for the deprivation of those left out is not enough. Some aspects of the human development analytical frame work and assessment perspectives must be brought to the fore to address issues that prevent universal human development

Chapter 4-sc references

¹ **Max-Neef, M. 1991.** Human scale development: conception, application and further reflections / by Manfred Max-Neef, with contributions from Antonio Elizalde, Martin Hopenhayn ; foreword by Sven Hamrell. The Apex Press, an imprint of the Council on International and Public Affairs, 777 United Nations Plaza, New York, New York, USA (212/953-6920) and 57 Caledonian Road, London, N1 9BU, U.K. (01-837-4014)

² **Systems Approach**

³ **Max-Neef, M. 1991.** Human scale development: conception, application and further reflections / by Manfred Max-Neef, with contributions from Antonio Elizalde, Martin Hopenhayn ; foreword by Sven Hamrell. The Apex Press, an imprint of the Council on International and Public Affairs, 777 United Nations Plaza, New York, New York, USA (212/953-6920) and 57 Caledonian Road, London, N1 9BU, U.K. (01-837-4014)

⁴ **Tax Models,** Summary Of Economic Models And Estimating Practices Of The Staff Of The Joint Committee On Taxation.

<https://www.jct.gov/publications.html?func=startdown&id=4373>

⁵ **Consensus Building.** Consensus building is a collaborative mediation process involving multiple parties requiring agreement on complex issues. Variations in the procedure are on the Internet.

⁶ **Dose Curve.**fn <http://medical-dictionary.thefreedictionary.com/dose-response+curve>

