

Workshop

Violated Earth – Violent Earth

Causes and Effects of Human´s Misbehavior and Nature´s Power



TUM Science & Study Center Raitenhaslach

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Memorandum

Motivation

The ecological crisis with climate change and loss of biodiversity as its hallmarks rapidly approaches the point where disastrous consequences with massive human suffering will become unavoidable, including extensive loss of land due to rising sea levels, catastrophic meteorological events with droughts as well as floods, lack of clean water, unprecedented medical hazards, and failing sanitary infrastructure. What is to be done in this situation? What is to be done in view of the fact that despite the blatantly dismal prospect the ecological burden has grown even larger during the last years? Solutions are urgently needed. They need to be considered carefully, however, because of constraints and interrelations. Preservation of a liberal civilization is one such constraint, feeding the still increasing world population another. And, as to the interrelations, just consider the biodiversity hazard of climate-friendly large-scale biofuel production.

A workshop held in the premises of the TUM Science and Study Center at Raitenhaslach on March 20 to 22, 2019 addressed the questions raised above. Its title "Violated earth, violent earth" reminded of James Lovelock's book "The Revenge of Gaia" (2007). Of note, it is not about intentional „revenge“, taken literally. In their wording, both Lovelock and the workshop in Raitenhaslach tried to put maximal emphasis on the detrimental reactions of the earth system which will manifest as steady worsening of human life conditions as well as catastrophic events.

The sheer number of people living on earth and striving for a decent live is already a major cause of these reactions. People account for 36% of the entire mammalian biomass, and their livestock, especially cattle, for another 60%, leaving only 4% to wild mammals (Bar-On et al., 2018). Beyond decency, however, there also is heedless abuse of natural resources, making Lovelock's image of "nature's revenge" quite plausible. In fact, self-damaging abuse of human beings with their own individual nature already, due to unhealthy nutrition, smoking, alcohol and drug consumption or lack of physical exercise which, in Western societies, together account for one third of the number of years lost due to ill-health, disability or early death (Crosland et al., 2019).

Homo sapiens always changed the ecosystem which he is a part of (Harari, 2014) and these changes have been significant already at times of low global population. However, they were small as compared to what we see now. While the people did not understand the wider ecological implications of their doing, ethical principles prevailed, typically enforced by religions, that prevented the disruptive effect of an exponentially growing economy which, nonetheless, finally was driven to the success by the power of industrial revolution and capitalistic mechanisms.

A stable autoregulation of ecosystems is a prerequisite of human life on Earth. But this autoregulation has become unstable under human influence which replaced diversity and redundancies by monocropping in agriculture and forestry. Analogously, mono-structures prevail in the economy and hegemonic structures in politics. Destabilization of systems under the pressure of an omnipresent unrestricted hype for growth and consumption is linked directly to the rise of anthropogenic catastrophes.

Modern science has brought about far-reaching knowledge about the complex interrelations of the world we live in, and the processes that shape it. This understanding engenders a high level of accountability for what we do or not do, because we cannot hide behind alleged ignorance about the ecological mechanisms and malfunctions. With the world population approaching the eight billion mark on the one hand and the possibility of sharing knowledge across the continents on the other hand, this responsibility has gained an unprecedented status. Human society as a whole is obliged to not only talk about responsibility, but to formulate clear measures of how to execute it. Everybody should realize that we have even more than just our own "skin in the game". The future of our children is at stake.

To countervail the disastrous developments at their root, the latest report to the Club of Rome (von Weizsäcker & Wijkman, 2018) has suggested to overarch the rational, science-based, enlightened approach to the world with a renewed "philosophy of balance". This philosophy addresses all aspects

of human life and emphasizes everybody's responsibility for the common goods, thus amounting to a "new enlightenment" as the authors have called it. Some believe that not only human thinking will change in this manner but that human nature also possibly adapts to the problematic situation.

Others count on active intervention, in keeping with the prevailing concept of a technically steerable nature, but now on a global scale as in the geoengineering of the climate Klimas (Niemeier et al., 2013). The transition from the more passive reduction of harmful effects to the active and thorough control of all relevant factors may not be as sharp as one might think, but it certainly engenders new hazards. The proposals to make humans and their habitats compatible with each other extend to genetic modifications as they are developed in space biology (Pontin, 2018). It goes without saying that such radical manipulations of nature have an unknown potential for damage of man.

While we still try to come to terms with present threats, new ones already arise at the horizon. However, it appears that the process of a "new enlightenment" has already started. Worldwide people are determined to understand the complex interrelations in our world, to invest in balanced, sustainable developments, and to aim for a good future of all mankind.

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Recommendations for Action

1. **Stop Biodiversity Loss.** To enable humankind's continued existence on planet Earth, it is as important to preserve on the global scale biodiversity function as to prevent further global warming.
2. **Avoid Tipping Points.** To properly describe the Earth system, its dynamics, and changes chaos theory must be taken into account; especially when it comes to explaining the exceeding of tipping points.
3. **Reformulate Societal Ethics.** To ensure the health of planet Earth, the development of adapted social ethics must go hand in hand with technical and economic efforts to maintain global health.
4. **Employ Artificial Intelligence.** To avoid ending up existing in artificial-intelligence dominated slavery, ways must be found to utilize the new tools of the digital age to reinforce human governance of socio-technical and Earth systems.
5. **Fight Ignorance.** The diminution of human misbehavior is to be considered a cornerstone of sustainable development of society, ecology, and human health.
6. **Foster Democracy.** To overcome barriers of existential relevance, humankind is well advised to orient itself towards science-based future perspectives, legitimated by democratic processes.
7. **Counter Alarming Evolution.** To ensure the continuing emergence of creative and inclusive approaches to overcoming existential threats caused by climate change causing global warming, the creation of effective strategies, and their successful implementation is a must.
8. **Ensure Global Health.** Human health is not only a major purpose in itself but also an essential precondition of keeping the planet Earth our common home. Maintaining the physical and mental health of the people enables them to protect biodiversity, to slow down climate change, and to respect the functioning of the earth system.
9. **Facilitate Circular Economy.** Based on the assumption that the environment can be considered our "second skin," it is obvious that humankind at large needs to take full responsibility for the preservation of the ecosystem function.
10. **Shape and Create Innovation.** With the risk of a complete breakdown of the Earth system at hand, a proactive approach towards shaping technology satisfying the actual needs of humanity and nature alike must be the leading principle of the "New Enlightenment."
11. **Redefine Education.** To cultivate a sustainable and adaptive form of "New Enlightenment," a strong focus is to be placed on education which has to transfer not only factual knowledge but also fundamental principles of ethics, arts, and humanities.
12. **Endorse Vulnerability.** Beyond all threats vulnerability of the Earth system and its inhabitants also is to be regarded as a fundamental openness for change and as a basic aptitude for recognizing in time where and how change of thinking and acting has to take place.

Explanations

Ad 1: Stop Biodiversity Loss

To enable humankind's continued existence on planet Earth, it is as important to preserve on the global scale biodiversity function as to prevent further global warming.

Sustaining a critical diversity of species and metabolic processes is a natural provision to prevent a systemic collapse in case environmental conditions suddenly change. In the past, humankind has demonstrated its ability to adapt to very different climatic conditions, hot and cold periods included. The animated nature also is able to adapt. However, processes of adaptation were mostly associated with the elimination of species in favor of those which demonstrated specific carrying capacities. Species got extinct but not life itself. Obviously, the Earth system has been able to heal itself and maintain a state of resilience. As Ernst v. Weizsäcker in his introductory speech insisted, time is ripe to understand but not undermine the self-regulation capacity of the Earth-system. It is more than necessary to take action to understand the intrinsic dynamics of the animated nature instead of discuss shortsighted pros and cons.

Monocultures in agriculture, for instance, are comparatively susceptible to external impacts. They need chemical or microbiological interventions to maintain stable conditions. The results of unstable conditions are well known, for example in case of agricultural monocultures. Likewise, a kind of "monoculture" in economic systems is taking hold in the assumption that growth of such systems guarantees efficiency. To keep such systems in a stable state interventions, for example in the form of subsidies, are unavoidable leading eventually to collateral damages. The global community is called upon to steer away from entertaining economic monocultures for the sake of short-sighted financial advantages.

Ad 2: Avoid Tipping Points

To properly describe the Earth system, its dynamics, and changes chaos theory must be taken into account; especially when it comes to explaining the exceeding of tipping points.

General properties of many if not all physical and biological processes, even though extremely complex, may be described by effects from *Systems Dynamics*. As Patrick Dewilde outlined in his introductory lecture most natural processes are highly non-linear and chaotic, meaning that at any moment small fluctuations can be exponentially amplified under the right propagation conditions. "Tipping points" by which all of a sudden new forms of life appear arise in this way, or, on the contrary, violent destruction annihilates life.

Run-away evolution can only be controlled by an emergent effect, such as "survival of the fittest" or, from a human point of view, human intelligence capable of activating a proxy that leads to a tipping point (e.g., the school strike initiated by Greta Thunberg, or the rise of Facebook, the iPhone, or even the acceptance of Pythagoras' theorem). Nature owes its ubiquitous and continuous creativity to chaos, and it is a major challenge to human intelligence to generate the necessary momentum, i.e., the tipping point, to counteract the destructive effects the careless exploitation of resources and the poisoning of the biosphere has created. Even so, there will never be a final solution, and humanity has to keep on evolving with the evolving earth, using its collective intelligence towards sustainability and optimization of the overall quality of life.

Ad 3: Reformulate Societal Ethics

To ensure the health of planet Earth, the development of adapted social ethics must go hand in hand with technical and economic efforts to maintain global health.

The ongoing developments in science and technology lead to a certain resistance within society, which is often referred to as “Angst” of a potential dominance of autonomous machines. As Klaus Mainzer mentioned in his keynote lecture, we live in an increasingly complex world. An enormous, ever-growing number of data are available ready to be used for solving the pressing problems of today and tomorrow. It appears that the “old” world is disrupted – similar to the situation after the Thirty Year’s War when the first Enlightenment commenced. From that time on, science became the driving force of knowledge gain and technology development. We certainly have not reached the point of ultima ratio, yet. But we are now in the position to enter a new era of science and AI-technology which could help us to master the increasing complexity of our civilization. Nevertheless, human governance and responsibility are still indispensable. In this sense, we need a new phase of Enlightenment.

Ad 4: Employ Artificial Intelligence

To avoid ending up existing in artificial-intelligence dominated slavery, ways must be found to utilize the new tools of the digital age to reinforce human governance of socio-technical and Earth systems.

To reach sustainable development for consistency and purposefulness it appears reasonable to use the new tools of the information age (artificial intelligence, simulation, scenario analysis, etc.) to e.g. carefully analyze the ever tighter net of global and regional environmental regulations and incentives set up by different sectors. The purpose is to ensure that they together reach their intended goal and do not unintentionally counteract each other’s.

Mathis Wackernagel pointed out that regulations resolved by state authorities are only executed and willingly accepted when citizens and executive managers alike realize existential, long-term advantages. Regulations are to be rated as the proverbial “skin in the game.” They become effective by subcutaneous application, as medical doctors might say. The focus must lay on future perspectives rather than on solutions that proved effective in the past.

In this context, it is worthwhile to recall that nature is not a museum but a system in continuous alteration, responding to changing ambient conditions and possibilities. Facing the challenges of the upcoming decades, any legal processes resolved by democratic institutions must provide development processes that appear successful under stressful conditions but allow adjustments and reorientations once novel impacts and scientific knowledge become available. Centrally planned economies, for example, have already demonstrated their inefficiency in many historical cases.

Ad 5: Fight Ignorance

The diminution of human misbehavior is to be considered a cornerstone of sustainable development of societies, ecology, and human health.

The underlying reason for our concurrent global problems is the stone-age old human agency to act against generally approved ethical norms and – more recently – against scientifically proven facts. Just three examples: We know that emissions of greenhouse gases lead to global warming, climate change, and eventually natural catastrophes. We know that agricultural monoculture drives loss of biodiversity and as a consequence destabilizes the ecosystem humankind depends upon. We know that excessive consumption of sugar combined with little physical exercise can lead to diabetes and premature death. We know all this – and much more – but we act against it and then complain about the consequences. Planet-violating forms of consumption have become the accepted as proxy for economic success, although we know that nature is our true indispensable second skin. To break such vicious cycles, it is advisable to use modern communication systems by which means information does not stay at the cognitive surface but goes “under our skin.” Developing means that

can positively alter the behavior of individuals and humankind, in general, must be an integral part of the “New Enlightenment” that Ernst Weizsäcker calls for in his report to the Club of Rome.

Ad 6: Foster Democracy

To overcome barriers of existential relevance, humankind is well advised to orient itself towards science-based future perspectives, legitimated by democratic processes.

With democracy, we refer to a process that includes self-determination, inclusion, the opportunity to make up one’s own mind, as well as transparency beyond majority voting. We understand democracy as the social decision-making process that is proven to best ensure the emerging of creative and inclusive approaches to problem-solving, creation of effective strategies, and their successful implementation. Democracy needs to rely on scientific facts that are established through robust, transparent, and testable processes. This enables a society to react open and creatively to changing conditions rather than succumbing to predetermined and imposed choices. This call (“come on”) is not only directed at policy-makers, but at the main acting groups like agriculture, industry, energy, transport, media, the bankers and last but not least us, the consumers and voters.

Ad 7: Counter Alarming Evolution

To ensure the continuing emergence of creative and inclusive approaches to overcoming existential threats caused by climate change causing global warming, the creation of effective strategies, and their successful implementation is a must.

Our planetary environment changes in an alarming way. Experts assume the carrying capacity of the (global) environment has already been exceeded, and the survival of human civilization is ultimately endangered. Global warming and climate change represent just one range of threats planet Earth is confronted with. The human species itself may be able to adapt to higher atmospheric temperatures as well as environmental destruction. Those damages caused by heavy storms, excessive rainfalls or flooding, for instance, but also the loss of human lives and property value. The recovery of biodiversity loss may take much longer than human civilization is able to compensate for artificially. In essence, it lies in our own interest to take good care of our “second skin.” Proactive health care of our “skin” must play a leading role in the “game!”

Ad 8: Ensure Global Health

Human health is not only a major purpose in itself but also an essential precondition of keeping the planet Earth our common home. Maintaining the physical and mental health of the people enables them to protect biodiversity, to slow down climate change, and to respect the functioning of the earth system.

The working group dealing with public health identified the topics below as the most pressing aspects to address immediately and crucial to reconsider in future dialogues.

Nutrition

Increasing national income correlates with increased consumption of meat. This induces an expansion of the agricultural industry that endangers the climate, the biodiversity, the supply of drinkable water, and the effectivity of antibiotics. Excessive consumption of meat also implies risks to individual health with increased mortality. We recommend information and education measures, transnational optimization of policies, and market design strategies to limit the damage inflicted on individual health and natural resources.

Aging

The impressive extension of the human life span during the 20th century relates to the unsustainable use of natural resources. This unsustainable use is aggravated by the lack of evidence-based medicine for the elderly which in turn results in erroneous and unnecessary therapies. Therefore, we recommend enhancing medical research on the multi-morbid old patient.

Public Health

Prevention does not require as many natural resources as therapy. Therefore, we recommend to expand and to improve public health efforts in Germany so that the health system reaches the quality found in comparable European nations, whilst keeping in mind that the benefits of a natural environment, that invites us to exercise and enjoy and provides beautiful healthy landscapes, is deeply underestimated.

Allergies

We currently observe an epidemic of allergic diseases such as asthma. This relates to the Western lifestyle that has little contact with a rural environment. The increased frequency of severe disease episodes is linked to climate change because plants release more stress factors with high immunological potential, and thunderstorms promote the distribution and the impact of these factors. In view of this epidemic, we need more specialists in Allergology and Environmental Medicine.

Pediatrics

Today, children spend most of their time inside the house with close-up activities at the computer or the smartphone. This behavior is directly related to the worldwide epidemic of myopia, which could be stopped if children spent sufficient time in bright daylight with distant objects. The impact of smartphone use on the mental development of very young children has not been fully explored. Positive effects are conceivable because, by using a smartphone, the prelingual child has an additional channel for early interaction with the world before being able to speak well enough.

Artificial Intelligence

Artificial intelligence is a highly versatile tool to use big data in prevention, diagnostics, and therapy. However, big data and artificial intelligence are problematic with regard to energy demand and data protection. The further development of AI has to take these problems into consideration - for instance by including analog information coding.

Research

Crises always come along with opportunities. In fact, they frequently provoke the emergence of new development. We, therefore, recommend an optimistic view towards the future instead of fear-driven policies. Research needs to be interdisciplinary, however, so that unexpected side-effects in a complex natural and societal system can be recognized early. Interdisciplinary approaches must, therefore, include the humanities and social sciences, as they have a long tradition of observing the societal part of this complex system.

Ad 9: Facilitate Circular Economy

Based on the assumption that the environment can be considered our "second skin," it is obvious that humankind at large needs to take full responsibility for the preservation of the ecosystem function.

We need to establish a true circular economy, i.e. a system that lives from within itself and, does not consume resources from the planets stores or sends waste to third world countries, and that strives to radically extend the lifespan of the products we use. While this is not a new thought, this is now crucial in the light of the increasing speed of innovation and the magnitude of the impact that some of these innovations may have on the planetary system.

The economic system can provide the means and framework for the necessary changes, and concurrently induce corrections to harmful forms of established decision-making.

Economy is a tool which helps regulate the exchange of goods and services. On the other hand, the Earth system including biodiversity and eco systems are the baseline for our economic systems. If they collapse, the economic system also collapses. Correction measures are mandatory. Integrating biodiversity and ecological concerns requires an overhaul of the taxation and subsidy system. In this context, it is necessary to consider the dangers associated with the volatility of the financial markets and the resulting threat for the sustainability of any system. This is best addressed on EU level or higher.

While from a general direction it may be clear, what needs to be done, in detail this is much more difficult and additionally complicated by the human factor human and the human- to- human relationships. We need leadership and the courage to step forward. Especially the young generation are demanding this. While stepping into leadership may feel risky, not doing so will be probably not be much riskier either the greater risk. Changing the system and implementing measures will require smart tactics, including hard measures as well as soft ones and a strong consideration of collaboration techniques making sure that all interest groups feel heard.

Ad 10: Shape and Create Innovation

With the risk of a complete breakdown of the Earth system at hand, a proactive approach towards shaping technology satisfying the actual needs of humanity and nature alike must be the leading principle of the “New Enlightenment.”

We have to recognize that human demands are overwhelming the capacity of the natural systems, putting at risk our life support system. Apparently, the original concept of the “Enlightenment” no longer suffices to react adequately to the concurrent global challenges.

In this context, one key element is a prospective shaping of technology to humanities actual needs, in German “Technikgestaltung.” Elements to successfully implement solutions for a robust, sustainable Planet Earth depend on taking a proactive approach towards shaping and creating innovation, policy, design and technology development (as opposed to post mortem technology assessments). Examples include assessments that required greenlighting from technology teams, financial viability teams as well as ELSA (ethical, legal, ecological and societal) teams. A meaningful Technikgestaltung requires interdisciplinary and holistic education in natural science, technology, and humanities.

Ad 11: Redefine Education

To cultivate a sustainable and adaptive form of a “New Enlightenment,” a strong focus is to be placed on education which has to transfer not only factual knowledge but also fundamental principles of ethics, arts, and humanities.

Enhancing environmental education is the main “soft sustainability” measure that can be taken. Education has to take place at all ages, countries and professions. Advanced methods of education are especially important, as current regulatory systems are much slower than the rate of innovation. A strong focus is to be placed on sustainability within all curricula developing human consciousness and responsible behavior. This could be done through education and training from earliest age, not only on sustainability at large, but also risk evaluation, and complexity understanding.

This is not only about children, but very much about adults too - learning to ask the question: how do we want to live in the future?

Ad 12: Endorse Vulnerability

Beyond all threats vulnerability of the Earth system and its inhabitants also is to be regarded as a fundamental openness for change and as a basic aptitude for recognizing in time where and how change of thinking and acting has to take place.

The vulnerability of the Earth system and its inhabitants corresponds, on the one hand, to the very real dangers and potentially catastrophic developments in the ecological crisis. On the other hand vulnerability represents a fundamental capability to sense and to adapt to novel developments. In case of humans it is their vulnerability which drives them to come up with countermeasures in time. This may mean that they enter proactively into the era of a "New Enlightenment." However, their vulnerability does not predetermine the specific kind of their response. Consider the following controversy: Many assume that the Earth system is basically good and that to end human ecological misbehavior is all what is needed to overcome the current environmental crisis and to return to the paradise they imagine to have existed before man misbehaved. This stance amounts to a fundamental conservatism and, in fact, can claim some good reasons since the Earth system as it used to be has been working up to now. Thus, a "New Enlightenment" may just end in strict conservatism. Yet, upon more extended inspection of the planet's past, the Earth system turns out to be not so friendly after all, having a history of horrific catastrophes which endangered large parts of mankind but were not man-made. In view of this history, some people strongly argue against a conservative retreat to the deceptive mother Earth. Instead, they see the current period of unprecedented scientific and technological productivity as an opportunity to prepare for coming disasters, man-made or not, so as to be able to defend mankind against any detrimental conditions to which it will be exposed. This stance amounts to a progressive technicism that will not shrink from global interventions if they appear rational. Such technicism builds on the characteristic feature of man to shape the conditions of his life. However, it tends to misjudge its ability to detect side effects, as the 20th century has shown. A "New Enlightenment" that deserves the name, will stay clear of paralyzing conservatism on the one side and uncontrolled technicism on the other.

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