

Ethics, Economics, Finance, and Governance for the Anthropocene

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Economy Project*

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Executive Summary

Third Millennium Economy Report

Ethics, Economics, Finance, and Governance for the Anthropocene

For virtually all of the last 10,000 years, our ancestors lived in a geological age called the Holocene in which climatic conditions were remarkably stable and natural resources were plentiful, renewable and seemingly inexhaustible. But during the last few hundred years, exponential increases in human population growth and in the scope and scale of what eventually became a fossil fuel based global market system resulted in a new geological age known as the age of the Anthropocene. In this geological age, global human activities are in the process of undermining the capacity of the biosphere to sustain our growing numbers and our species has become a geological force that will determine the future of life on Earth.

At the dawn of the new millennium, we face multiple interconnected crises: the deterioration of Earth's life support systems, chronic unemployment even in the developed economies, persistent and crushing poverty, an unstable and overreaching financial system, government institutions ill-equipped to deal with the scope and scale of these challenges, and ongoing rapid population growth in many parts of the world. Yet we lack an accurate intellectual map of where we are and where we should be going. The thought systems that serve as the intellectual foundation for many of the most influential institutions that manage society are in critical need of an update in order for us to effectively respond to these interconnected crises.

We entitled this report *Ethics, Economics, Finance, Governance for the Anthropocene* for two reasons: 1) to indicate that the crises we face cannot be resolved in the absence of fundamental rethinking of our present systems of ethics, economics, finance and governance; and 2) to emphasize that we have entered a new era, "the age of man," in which human activities are massively disrupting Earth's life support systems. The following is a brief summary of the sections in this report:

1) Why We are Lost

We are lost because the assumptions embedded in the stories we are now telling ourselves about how the world works are often incompatible with our most advanced scientific knowledge of the real world. Remarkably we find, this knowledge is in broad alignment with how diverse spiritual traditions characterize the relationship between self and world. However, our systems of ethics, economics, finance and governance are rooted in outdated thinking that no longer serves us well. Scientific knowledge provides a coherent basis for making the changes in our economic, financial and governance systems. But this knowledge must be connected to 1) a clear-eyed understanding of our circumstances; and 2) a new (or perhaps merely forgotten) ethical understanding of human identity.

2) Living Safely and Justly in the Anthropocene

We summarize here much of the evidence that reveals that the human project exceeds the Earth's regenerative capacities and that this has resulted in persistent poverty and increasing inequality. This evidence also reveals that these conditions mitigate against shared well-being, even for

those more well off. We also provide here a set of metrics that mark the planetary limits or boundaries which can guide us toward realizing the goal of living safely, justly and sustainably on planet Earth.

3) Ethics for the Anthropocene

Advances in scientific knowledge have revealed that many of our moral beliefs and the ethical principles in which they are expressed rest on dangerously outmoded and unscientific assumptions. This does not mean that all our existing moral beliefs must be discarded or overturned. But it does require testing, adjusting, and re-envisioning them. Many of our beliefs have legitimated, *and even celebrated*, practices that have led to the current sharp and accelerating decline in life's prospects. These must be replaced by an ethic of life affirmation consistent with our fresh, but still incomplete, understandings of our place on Earth and in the Universe.

From this point of view, our reconstructed economics, finance and governance will rest on at least three rather simple, interconnected, premises: 1) that persons are interdependent members of communities that include humans and other life form that depend on, and co-evolved with, the Earth's biogeochemical processes; 2) persons have a fundamental duty to care for where they are and the communities in which they live; and 3) care for life requires the respectful use of low entropy sources of energy and materials (e.g. the products of photosynthesis: forests, fertile lands, fossil fuels, etc) that make life possible. *We call these, respectively, membership, house-holding, and entropic thrift.* Living in keeping with these three premises may be summarized as living in right relationship with life and the world. This ethical framework informs the reconstruction and reconfiguration of economics, finance, and governance that follows.

4) Economics for the Anthropocene

Neoclassical economics as covered in today's economics textbooks (and practiced by both conservatives and liberals alike as the core economic doctrine driving the political affairs of an increasing number of countries) rests on assumptions from the eighteenth and nineteenth centuries that are incompatible with the findings of contemporary science. Tragically, the unscientific assumptions in neoclassical economic theory and the mathematical formalism used by mainstream economists effectively undermine the prospect of implementing scientifically viable and equitable responses to the multiple crises of our time.

5) Macroeconomics for the Anthropocene

The macroeconomic theory and the associated computer model offered here are not predicated on these assumptions. They are based on systems dynamics and provide political leaders and economic planners in highly industrialized prosperous countries with a coherent basis for making the transition to a low growth or steady state economy using many of the tools and concepts of current theory. This transition is required in order to leave ``ecological space`` where growth is justified for human well-being and to prevent the further decline in the Earth's life support systems. The program makes it possible to plan for and manage this transition in ways that minimize disruptions in the real economy, maintain high levels of employment, and enhance the quality of life and the security and well-being of the general population.

6) Regenerative Capitalism in the Anthropocene

Here we explore what will be required to achieve a paradigm shift from current economic theory to a *Regenerative* economic system. It will demand of us a shift from a mechanistic to an ecological worldview, it will understand *the use and limitations of markets*, and demand a more complex and evolved understanding of wealth than what's assumed in Financial Capitalism. It will be grounded in and aligned with the latest scientific insights into how the universe actually works, coupled with humanity's enduring spiritual insights. Our economy must unlock the potential for regenerative true wealth creation. This begins with radical resource productivity improvements, the restoration of vital ecosystem function and the stabilization of planetary life support systems, and carries on through to the an enlightened purpose and a realization of expanded collaborations never before manifested or even imagined. Regeneration is not a new theory; it is not a political philosophy of the left or right, nor simply a new name for an old idea – “sustainability”. Regeneration defines the evolutionary process itself, and it is our task, now, to bring our economic system into alignment with it. When we do, like turning a canoe downstream after a long struggle against the current, our journey will be lightened.

7) Finance for the Anthropocene

After the near collapse of the global financial system in 2008 many academics and policy makers realized that the claim by market fundamentalists that the market system is self-regulating and self-correcting is bogus. But efforts to regulate this system in ways that could prevent a similar collapse from occurring in the future remain unsatisfactory. They are unrealistically premised on the assumption that the amount of capital circulating in the virtual economy of the global financial system can and must increase indefinitely to provide the liquidity required to fuel the growth and expansion of the real economy of the global market system. The unquestioned presumption here is that the optimization of returns on financial capital is the most efficient way to stimulate economic growth and generate wealth.

This approach falsely assumes that there should be no limits to the aggregate growth of the stock of financial capital and no public criteria for making distinctions between qualitative differences in the kinds of growth financed. The case will be made here that our multiple crises can only be addressed based on a holistic understanding of the connections among: 1) capital in the virtual economy of the global financial system; 2) the growth of the real global economy; and 3) the regenerative capacity of human society and the biosphere to enrich and support life. For this reason, we focus on the primacy of real investment decisions – qualitative and quantitative – as the critical leverage point to drive the transition to a regenerative and therefore sustainable global economy. We assert that we are in a state of “financial overshoot,” which accompanies ecological overshoot. We argue that this reality makes real investment decisions by large state and private actors in the economy a matter of vital public interest, demanding global public oversight and accountability.

8) Governance for the Anthropocene

In addition to the historic dysfunction of government at the national level, particularly in the world's current superpower, the existing system of international governance and its primary institution, the United Nations, is woefully inadequate to address the crises of the Anthropocene. To live safely and justly on a flourishing Earth there must be an accountable global governing system or connected network of systems that clearly recognizes the need to address specific, indivisible global issues. *Global issues* cannot be resolved by the current system whose primary

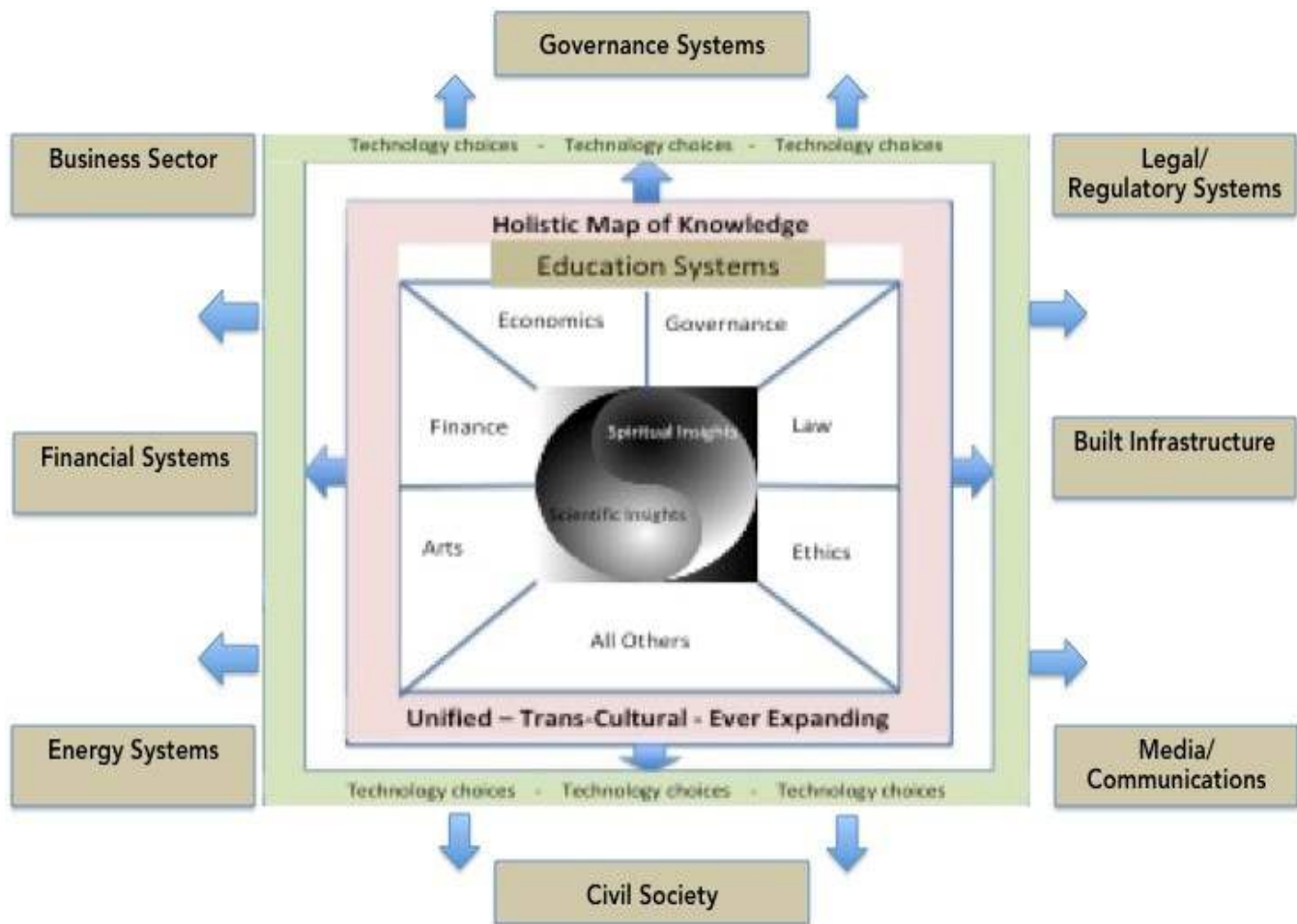
goal is to maximize the allegedly separate vested interests of individual sovereign nation states. The new system could take the form of new global institutions such as a network of regional governing bodies; new directions for existing global institutions such as the G-8 or G-20; and/or bi-lateral or multilateral agreements between major players such as the United States, China, India, and the EU. This new approach to tackling global issues must at the same time respect the principle of subsidiarity—that governing works best closest to individuals and the communities in which they live.

The institutions described in this chapter are offered as examples that together could serve as a functional template for addressing critical and indivisible global issues and problems. These institutions include: 1) a Global Commission with lawmaking and executive powers for adopting and implementing responses to global problems; 2) a Global Reserve that would be responsible for and have the authority to measure and recommend the allocation and distribution of Earth's life support budgets in accordance with the ethical principles set out in this report; 3) a Trusteeship of Life's Commons that would have the legal power and resources required to protect and restore the earth's commons, such as the oceans and the atmosphere; 4) a Global Court that would have the authority required to issue binding rulings that hold corporations, nation-states, and/or their subsidiaries to the rule of ecological law.

Conclusion

In summary, we are calling for a new intellectual map to navigate the unprecedented challenges of the Anthropocene. Such a map must be first and foremost grounded in our latest scientific insights about how the universe actually works, which are remarkably aligned with many of the insights about the relation of self and world in the world's religious traditions. It must also redefine many critical domains of knowledge in alignment with these insights, influence our technology choices, and then guide the principal institutions by which we manage the human project on this planet. This map could, in our view, could enlighten and inform numerous spheres of practical action such as business administration, public policy, urban planning, and the legal system.

The diagram below illustrates the intellectual map that informs all of the commentary in this report:



If there is a single lesson to be learned from modern evolutionary biology, it is that species that survive adapt to changed circumstances. In the age of the Anthropocene, this lesson will be vitally important for our species.

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PART I:

The New Story of Science and the Crises in the Anthropocene

The dilemma faced by humanity in the age of the Anthropocene is succinctly described in an article written by William Rees, one of the members of the steering committee for this report: “With no government or mainstream international agency willing to openly contemplate, let alone articulate in public, the revolutionary policy responses evoked by our best science, the modern world remains mired in a swamp of cognitive dissonance and collective denial” (Pratarelli, 2008; Pratarelli & Aragon, 2008; Rees 2009, 2010). The admittedly ambitious goal in this report is to demonstrate that it is possible for the world to climb out this swamp and begin the arduous process of implementing the revolutionary policies evoked by our best science. The aim in this chapter is to demonstrate that the new story of science has provided us with a radically new understanding of our existence in the real world which could greatly enhance the prospect of implementing these policies.

This is a story about how we came to be in a universe that emerged about 13.7 billion years ago from a point nothing in the vacuum state. At the moment when this momentous occurred, all of the energy that would drive the expansion of the universe emerged and space began to unfold into the nothingness of the vacuum state. Particles created during the first milliseconds in the expanding universe are present in our bodies along with the heavier atoms forged by the heat generated by nuclear fission in massive stars that ended their lives as supernovas.

The evolving complexity of the universe eventually allowed for the emergence of a self-replicating molecule on a planet located on the outer edge of a spiral galaxy and all of the life forms that have existed on this planet are its direct descendants. The interactions between the evolving life forms on planet Earth created and sustained conditions suitable for life and allowed for the evolution of increasingly more complex life forms. This evolutionary process eventually resulted in the emergence from the web of life of a species that became fully modern humans. The question we will now consider is how did the members of this species among the millions that have existed on this planet manage to increase their numbers and the scope and scale of their activities to the point where the capacity of the system of life on an entire planet to support their existence is being undermined.

The New Story of Science about Human Evolution

The answer to this question is that our species evolved against all odds the capacity to acquire and use fully complex language systems. The incremental changes in the brains and bodies of our hominid ancestors that culminated in the ability to acquire and use fully complex language systems probably occurred over a period of about two million years. But there is now a large and growing consensus that this process was not complete until a small group of hominids living in present day Ethiopia, Kenya and Tanzania evolved the capacity to use a fully complex language system with grammar and syntax about 64,000 years ago. Even more remarkable, recent studies

in human genetics have revealed that all of the 7 billion people living on this planet today are the direct descendants of about 2,000 individuals in this small lineage of hominids.¹

The members of the original tribe of fully modern humans spoke the same language, lived in the same culture, and closely resembled one another in physical terms. After groups of their descendants migrated out of Africa, minor mutations that enhanced the prospect of survival in different ecological niches resulted in changes in physical appearance and language systems and cultures became increasingly more diverse. But recent research in both the hard and behavioral sciences has revealed that all surviving fully modern humans are very similar in genetic, cognitive and behavioral terms.

Research in the behavioral sciences has also shown that that moral concepts and emotions in all normal human beings are remarkably similar in spite of the differences in standards for ethical behavior in diverse cultural contexts. For example, the anthropologist Donald Brown has compiled as impressively long of these universal moral concepts and emotions which includes distinctions between right and wrong, empathy, fairness, rights and obligations, prohibitions against murder, rape and other forms of violence, shame, taboos and sanctions for wrongs against the community (Brown, 1991; Brown , 2004).

The New Story of Science in Physics

In the worldview of classical physics, human beings were cogs in a giant machine and linked to other parts of this machine in only the most mundane material terms. The knowing self was separate, discrete and isolated from the physical world, and all the creativity of the cosmos was exhausted in the first instant of creation. As physicist Henry Stapp points out, "Classical physics not only fails to demand the mental, it fails to even provide a rational place for the mental. And if the mental is introduced ad hoc, then it must remain totally ineffectual, in absolute contradiction to our deepest experience."²

All of the assumptions about physical reality in Newtonian physics were challenged and effectively undermined during the second scientific revolution of the twentieth and twenty first centuries. For the purposes of this discussion, this little known scientific truth is vitally important because the economic theory now used by virtually all mainstream economists, neoclassical economics, is predicated on unscientific assumptions about physical reality in Newtonian physics. The new physics revealed that the cosmos is a sea of energy in which more complex systems spontaneously emerge that display novel properties that cannot be reduced to or explained in terms of their constituent parts. It also revealed that matter cannot be dissected from this omnipresent sea of energy and it is not possible to observe matter from the "outside." The universe in this physics is a single significant whole in which all processes are interconnected, interrelated and interdependent at all scales and times.

As the physicist Werner Heisenberg put it, the cosmos "appears as a complicated tissue of events, in which connections of different kinds alternate or overlay or combine and thereby determine the texture of the whole."³ The new story of physics does not suggest that our existence was planned

¹ Lynn Jorde, Michael Bamshad, and Alan Rogers, "Using Mitochondrial Nuclear DNA to Reconstruct Human Evolution," *BioEssays* 20 (1998): 126-136; A Gibbons, "The Mystery of Humanity's Missing Mutations," *Science* 267 (1995):35-; L.L. Cavalli-Sforza, P. Menozza, and A. Piazza, "Demic Expansions and Human Evolution," *Science* 259 (1993):639-646.

² Henry P. Stapp, "Quantum Theory and the Physicist's Conception of Nature: Philosophical Implications of Bell's Theorem, " in *The World View of Contemporary Physics*, Richard E. Kitchener, ed. (Albany: State University of New York Press, 1988), p. 38.

³ Werner Heisenberg, *Physics and Philosophy* (London: Faber, 1959), p. 96.

or preordained by God or any other spiritual agency. But it does provide a place for the knowing mind and a basis for believing that human life and consciousness are embedded in and emergent from a self-organizing and self-perpetuating cosmos at a very high degree of complexity.

In relativistic quantum field theory, physical reality is emergent from and embedded in interactions between matter-like entities called quanta and immaterial force fields, and quanta manifest as “either” waves or particles. However, quanta are not discrete and separate entities acted upon by external forces like atoms or masses in classical physics. They emerge from a web of interaction with other particles, and the only action that we can observe, detect or measure results from these interactions. As Stapp puts it, “each atom turns out to be nothing but the potentialities in the behavior pattern of others. What we find, therefore, are not elementary space-time realities, but rather a web of relationships in which no part can stand alone; every part derives its meaning and existence only from its place within the whole.”⁴

Given that quantum mechanical events cannot be directly perceived by the human senses, experience does not teach us that physical reality emerges from the interactions between fields and quanta. But this would be quite obvious if you were reduced in size about twenty orders of magnitude and could observe the quantum mechanical events that result in the emergence of matter quanta, atoms and molecules. The world as you would then perceive it would be a web of interactions between fields and quanta in which nothing is separate and distinct and everything is seamlessly connected with everything else. If one could see the real world on this level, the universe would be perceived, as Brian Swimme and Thomas Berry put it, “not as a thing, but a mode of being everything.”⁵

Since the human body in Einstein’s view is a collection of material particles, he concluded that any sense we might have that our physical self is separate from world is an illusion fostered by a lack of understanding of the actual character of physical reality. “A human being,” said Einstein, “is a part of the whole, called by us the ‘Universe,’ a part limited in time and space. He experiences himself, his thoughts and feelings as something separate from the rest--a kind of optical illusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from the prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty. Nobody is able to achieve this completely, but the striving for such achievement is in itself a part of the liberation and a foundation for inner security.”⁶

The New Story of Science in Biology

The new story of biology challenges mechanistic assumptions about the relationship between parts (organisms) and whole (biosphere) in the old story about biological reality in the concept of emergence. The term emergence applies to situations where new wholes spontaneously appear that have properties or display behavior that cannot be reduced to or understood in terms of their constituent parts. As evolutionary biologist Ernst Mayr put it, living systems “almost always have the peculiarity that the characteristics of the whole cannot (not even in theory) be deduced from the most complete knowledge of components, taken separately or in other partial combinations. This appearance of new characteristics in wholes has been designated emergence.”⁷

⁴ Henry Stapp, “Quantum Theory and the Physicist’s Conception of Nature: Philosophical Implications of Bell’s Theorem,” p. 54.

⁵ Brian Swimme and Thomas Berry, *The Universe Story* (San Francisco: Harper Collins, 1992), p. 27.

⁶ Albert Einstein, quoted in *New York Post*, November 28, 1972.

⁷ Ernst Mayr, *The Growth of Biological Thought: Diversity, Evolution and Inheritance* (Cambridge, Mass.: Harvard University Press, 1982), p. 63.

The new story of science has revealed that the process of emergence has resulted in higher levels of organization and more complex physical processes at all scales and times in the history of the cosmos. On the most basic level of physical reality, the interactions between quanta within and between fields result in fundamental particles with emergent properties that do not exist in the quanta. The fundamental particles interact with other fundamental particles to produce the roughly 100 naturally occurring elements that have emergent properties not found in the particles. The interactions between the elements result in compounds and minerals that have emergent properties not present in the elements. The interactions between the compounds and minerals resulted in the emergence of the ancestor of DNA which displayed properties that did not exist in the compounds and minerals. And the process of emergence during the entire history of the evolution of life on earth resulted in increasingly more complex life forms and biological processes.

In the new story of biology, the system of life is not a machine with discrete and separate parts with linear causal connections between the parts. It is a nonlinear system with an indeterminate number of initial conditions and feedback loops and its future cannot be predicted with absolute certainty regardless of any future advances in scientific knowledge. After scientists began to study the nonlinear dynamics of biological reality with the use of increasingly more sophisticated computer systems, a radically new understanding of part/whole relationships in this reality emerged.

This research revealed that the interactions between parts (organisms and inorganic compounds) sustain conditions that perpetuate the existence of the whole (system of life) by regulating the relative abundance of atmospheric gases, producing fertile soils, and detoxifying air and water. This research also disclosed the existence of positive and negative feedback loops among proteins, lipids, nucleic acids, cells, tissues, organs, and organisms which ensure that species and ecosystems evolve adaptively in response to changing conditions and selective pressures in the environment (Nadeau, 2003).

One of the easiest ways to begin to understand biological reality in scientific terms is to spend some time looking at digital photographs and videos taken by Earth orbiting satellites. In these images, the biosphere is a single living system and everything in this system is connected to everything else. Human activities and environmental systems are embedded in and interactive with one another on the local, regional and global levels, and the state of the whole is a function of the complex web of dynamic relationships between all the parts. And as the scientists who study the observational data from these satellites know very well, the scope and scale of environmentally destructive human activities have increased to the point where the capacity of the system of life to support human life is being undermined.

Lessons from the New Story of Science

The discussion that follows will be predicated on and informed by the following lessons from the new story of science:

- The cause of the environmental crisis and the manner in which it can be resolved are the same. This crisis exists because one species among the millions that have existed on this planet evolved the capacity to acquire and use fully complex language systems and it can be resolved by using this extraordinary ability to articulate new narratives which are commensurate with the terms of human survival in the age of the Anthropocene.

- The narratives about economics, finance and government that now serve as the basis for coordinating global human activities emerged in the age of the Holocene and are predicated on unscientific assumptions about physical reality which are not commensurate with the new terms of human survival in the age of the Anthropocene.
- These unscientific assumptions are effectively undermining the prospect of implementing the scientifically viable and equitable public policies and economic programs needed to mitigate the impacts of climate change and to resolve other menacing societal problems.
- The successful implementation of these policies and programs will require new moral values and standards for ethical behavior which are commensurate with our most advanced scientific understanding of the relationship between self and world and the new terms of human survival in the age of the Anthropocene.

It is not realistic to assume these massive changes could occur in the present geopolitical climate. But for reasons that will be discussed later in this report, this climate could change over the next few years in ways that could greatly enhance the prospects that these remarkable developments can occur. This means in our view that there will be an opportunity to effectively deal with the multiple crises that now face humanity and to create in the process a more just and peaceful world.

Summary & Conclusion—Flourishing in the Anthropocene

“We stand at a critical moment in Earth's history, a time when humanity must choose its future. As the world becomes increasingly interdependent and fragile, the future at once holds great peril and great promise. To move forward we must recognize that in the midst of a magnificent diversity of cultures and life forms we are one human family and one Earth community with a common destiny. We must join together to bring forth a sustainable global society founded on respect for nature, universal human rights, economic justice, and a culture of peace. Towards this end, it is imperative that we, the peoples of Earth, declare our responsibility to one another, to the greater community of life, and to future generations.”

--The Earth Charter

Here is what must be done:

We must embrace compassionate retreat. The human project and presence has become too large and grotesquely unfair. We must learn to live within Earth's limit and the share its fruits and those of human ingenuity with our fellow humans and the rest of the life with which we share heritage and destiny. As members of life's community there is a duty to restore and regenerate life's household; and where possible restore low entropy sources and cleanse congested sinks. As is the case in a battle that cannot be won we must retreat while limiting the harm to the most vulnerable members of life's commonwealth. High finance in particular, symbolically and literally at the front line of this doomed battle, can and must embrace a humble retreat.

Economics, Finance, and Governance must be grounded in Earth System Science and a Holistic Ethic. Institutions of economics, finance and governance must themselves be governed by individuals literate in science; and committed to holistic ethical principles such as those found in the Earth Charter. All universities and colleges must urgently reconstitute their instruction in these subjects according to the same two criteria; and new programs must be founded on these principles.

The institutional frameworks and decision making processes in our economic and political systems are predicated on dangerously outmoded assumptions that are at variance with, the scientific discoveries of the last two hundred years. Like “orphans” these ways of thinking remain alive; even though their parents—the assumptions about the universe and the human place in it from which they arose, principally from the European Enlightenment of the 17th and 18th centuries —have been eclipsed.

In what follows we begin by summarizing many of the major problems with each of these systems of thought which emerged in the Holocene; and then contrast them with the a characterization of what is needed for the Anthropocene.

The Economic System

There is no basis in the neoclassical economic paradigm for even recognizing that the “real” economy is made up of energy and material flows that obey the laws of physics, chemistry and biology. This paradigm counsels and promotes exponential growth despite overwhelming scientific evidence that this is a program for ecological disaster. Equally problematic, the primary beneficiaries of this growth have been the roughly 20% of the global human population living in

developed countries while over 50% of this population living in underdeveloped and developing countries continues to live under conditions of extreme poverty. Economic growth in some developing countries, like China and India, has resulted in dramatic improvements in standards of living for a small percentage of the population living in these countries. But the price paid for these improvements was vast increases in emissions of carbon dioxide and other ecological ills.

If we are to coordinate global economic activities within the safe operating zone defined by the planetary boundary conditions, this will require the rapid implementation and widespread use of a new model for macroeconomics based on the idea of a regenerative economy. . This model will include the key macroeconomic variables of consumption, government spending, investment, employment, and trade. But these variables will be configured in ways that privilege a balance between consumption and investment and the contributions that could be made to the resolution of environmental problems by public, community and private sectors. It would also be based on a different conception of productivity growth and the conditions required for profitability. This model would also include new macro-economic variables on energy and resource dependency, limits on emissions of carbon dioxide, the nature of ecosystem functions, and accounting for low entropy sources and their respective sinks.

In the real economy in the age of Anthropocene a regenerative system is built on a hierarchical or fractal relationships among its component parts, including the human species, and that it is essential for these parts to live in what Peter Brown calls “right relationship”ⁱ with one another. Declining health for one part of the system means declining health for the entire system, since it is one interdependent system. In this sense, regenerative capitalism as a vision is an “all or nothing” proposition. Incrementalism, which is what we’re now doing, without clarity of vision will not work. There are a number of implications of this view:

- We need to manage “wholes” and be clear about what “whole” is that we are trying to manage. This will separate issues and generally push toward subsidiarity, ie, managing issues in as decentralized fashion as possible, while recognizing those issues like climate that must be managed more centrally.
- Our energy system must transition as fast as possible off fossil fuels since we know we have already overloaded the atmosphere with heat trapping gasses.
- We must transition our agriculture to an organic system, free of fossil fuel dependency and toxic chemicals that stay in *our* environment.
- We must heal the planet’s ecosystem function that has been degraded, beginning with the natural carbon sinks we know how to manage: the grasslands, and the forests
- We must transform our chemical industry to water based chemistry
- We must use only naturally regenerative materials at a sustainable rate, which means reinventing many industries from electronics to aerospace that are today dependent upon finite resources.
- We must control the growth of the human population because we are using up too much natural capital at the expense of other living beings, to which our own prosperity is intricately linked in ways we do not yet fully even understand.

Investment must be focused on the long-term protection of the assets on which basic economic services depend. And the new targets of investment must be low-carbon technologies and infrastructures, and resource productivity improvements which protect and regenerate ecological functions, maintain public spaces, and enhance human well-being. In the new macroeconomic model, long-term security will have more weight than short-term financial gain, and social and ecological returns on investment will be more important than conventional financial returns. And

one of the core principles in this model is that capital markets must be reformed and legislation must be passed that prevents destabilising financial practices like those which caused the virtual meltdown of the global financial system in December 2008.

The new macroeconomics model will also be ecologically and socially literate and will not be based on the absurd assumption that the economy operates in a domain separate from the larger society. This will require a new accounting system that will take into account measures of human well-being and happiness which are conspicuously missing in the GNP system. This new model would also be capable of simulating the complex interactions between economic, financial and ecological variables and would include relevant financial, economic and ecological data. And it would also provide a coherent basis for implementing public policies and economic programs that increase employment, maintain economic stability, preserve and protect natural resources, reduce resource consumption to remain within the limits of planetary boundaries, and meet the demands of social and ecological justice.

The New Financial System

Money and Investment for a Finite Planet. The primary justification for creating and maintaining the complex global financial system is that it promotes the efficient growth and expansion of the global economy, thereby delivering growing prosperity to humanity in the process. In fact, the debt based financial system is predicated on the assumption in neoclassical economic theory that there are no limits to economic growth, as scarcity promotes substitution and innovation. The authors of this report reject the validity of this perpetual growth assumption.

The recent near collapse of the financial system and the ongoing crisis now centered in Europe suggests there are fundamental design flaws in the architecture of the financial system, exacerbating the well critiqued moral deficiencies of its actors and leaders. What was believed to promote greater efficiency, growth and prosperity has degenerated into a speculative casino in a highly complex, highly leveraged, predatory and often fraudulent and violent risk valuation and transfer game disconnected with the needs of the real economy, yet creating shock waves that have been catastrophic to the real economy and wasteful to our increasingly fragile ecosystem in the process.

The mainstream critique of the financial system centers around flawed regulatory oversight needed to reign in human greed and hubris in order to control firm level and systemic risk, while defenders of the system warn that the cure could be worse than the disease. Both sides of the argument fail to acknowledge that these problems result from fundamental and pernicious design flaws in neoclassical economic which are predicated on the assumption that exponential material growth is possible and desirable on a finite planet with limited resources.

The challenge here is not merely to establish new rules and regulatory agencies to deal with the problems of too big to fail multi trillion dollar financial behemoths and to put an end to the illegal, immoral and predatory behavior on Wall Street. It is also to reconnect the practice of finance to the social systems it is intended to support and create a financial system which operates within the finite boundaries of the biophysical systems upon which all life depends. And accomplishing the feat will require a fresh inquiry and holistic understanding of all the core functions of finance.

In the new global financial system, both the quality and quantity of real investment will be a product of the design of this system. For example, the quality of real investment will determine

what type of energy and transportation systems we will have in the future. The quantity of investment presents an uncomfortable challenge, for if there are limits to growth, and investment drives growth, then it stands to reason that there must be limits to investment. This implies that there will also be lower limits to debt capacity than in the perpetual growth paradigm.

Shifting from a world in which the flow of investment is an accepted right of the owners of capital in the so called free market to a world where the quality and quantity of real investment becomes a decision of vital public interest to all of humanity is staggering to contemplate. The process of making this transition will be very challenging intellectually, and enormously difficult in practice. If we are to effectively deal with this problem, policy makers and those presently in control of the aggregate capital investment process, a tiny minority of the human population, must realize that business as usual in the existing global financial system is a program for ecological disaster. We must get down to the business of creating a financial theory and practice that is commensurate with the terms of human survival in the age of the Anthropocene. And we must also realize that this will require a holistic decision making process which recognizes the connection between real investment decisions – qualitative and quantitative - and the social and ecological impacts of this investment in the real world.

The New System of Government and Environmental Law

The present system of government is predicated on the construct of the sovereign nation-state and it is assumed that each of these states is empowered to manage their economies and create financial policies which serve their perceived vested interests. But in the real world, these economies are embedded in a global economic system and the economic activities in this system are in the process of undermining the capacity of the biosphere to support life. It is also assumed that sovereign nation-states can determine which environmental laws are implemented within the territories governed by these states and how these laws will be enforced. The obvious problem here is that there are no boundaries between sovereign nation states in real world and human and environmental systems are embedded in and interactive with one another in this world on the local, regional and global levels.

Equally problematic, the only source of political power in the existing system of international government, the United Nations, is the sovereign nation-state and there is no basis in this system for implementing viable solutions for problems in the global environment. The inconvenient truth here is that the environmental crisis cannot be resolved in the absence of more effective institutions of global governance.⁸ We realize that creating such institutions is fraught with dangers. On the other hand, there is no basis in the current system for preventing an ecological catastrophe and it legitimates unconscionable inequality and deprivation.

For example, environmental law lies within the province of each sovereign nation-state and in many countries is largely predicated on the construct of private property. Consequently, economic interests take precedence over ecological concerns and little or no consideration is given to the aggregate scale of human impacts on environmental systems. If we are to resolve the environmental crisis, it will be necessary to create international environmental laws and the associated legislative, administrative and judicial systems which have the means to perform the following functions: 1) enforce the rules and regulations associated with the environmental laws in a fair and equitable way; 2) monitor the impacts of human activities on the environmental

⁸ *Other provocative suggestions about global governance and how to get there are Monbiot (2004); and Samraj (2007).*

systems protected by the environmental laws; and 3) conduct independent judicial oversight to ensure compliance with these laws.

Re-Grounding Ethics

The ethical standards for moral behavior and decision making in highly industrialized Western countries are predicated on conceptions of human origins and our privileged place and importance in the universe which are no longer commensurate with the terms of human survival. We now know that the assumption that the natural world was created for our use and benefit and that the resources of nature are inexhaustible is dangerously wrong. The ethical standards which will allow us to live on a flourishing Earth in the age of the Anthropocene are very different and can be briefly stated as follows: 1) persons are fundamentally interdependent members of communities that include humans and other life; 2) we have a fundamental duty and moral responsibility to preserve, protect and care for the natural environments in which all human beings and other life forms exist; and 3) this will require care for the low entropy sources and sinks for the disposal of their wastes. We call these, respectively, membership, householding, and entropic thrift. Living in keeping with these three premises may be summarized as living in the right relationship with life and the world.

A. Membership: Recognition that we share heritage and destiny with all other people and all other life on this planet, as well as the dependence of life on physical chemical, and biological evolution, must lead us to *expand the moral community to include all persons and all life*. The attitude of domination of the world and its peoples must be replaced with *respect and reciprocity* toward *all that is*. Individualism must give way to holism. *We are members of, not masters over, life's commonwealth*. All persons in all cultures have equal moral claims to flourishing, constrained and enhanced by the claims of other species for their place in the sun. The human claim to nobility rests on using our ability to foresee the future to enable its flourishing.

B. House-holding: When humans see themselves as intrinsically members of communities, care for those communities is simply an expression of who we are and what we do. *The idea of the Earth as a collection of resources and waste receptacles must give way to that of the Earth as life's household ("oikos" – the root of economics and ecology)*. Earth is the home to life's commonwealth where all species interact with each other and the planet's biogeophysical systems. It is our calling to facilitate the thriving of life to continue on its metaphysical journey into novelty.

C. Entropic Thrift: *Low entropy stocks and flows and the sinks for high entropy waste must be used judiciously and with respect*. Like all other far from equilibrium systems, our lives depend on low entropy. Broadly defined, low entropy energy is a fundamental good that underlies all other "goods." It enables the far from equilibrium, autocatalytic living organisms like us to exist and thrive. Wasting that which makes life itself possible is a fundamental moral wrong. *The Earth's limited capacity to construct and maintain far from equilibrium systems implies strong moral limits to human appropriation of low entropy energy and material and of sinks for human waste*.

"Progress" today, which tends to be understood as increased consumption by a massive and growing human population, is now in the process of devouring its own possibility. Once we recognize the evolutionary—complex systems worldview we are offered a different over-arching ethos. Its framing metaphor is "right relationship:" respect for, and reciprocity with life's commonwealth. This involves an end to slavery, an end to the tyranny of the market over

humanity and nature alike, and the celebration of our citizenship in a universe ever evolving into novelty. In short, good house holding; or better yet, Earth Citizenship.

Here is How to Do It.⁹

Making the Most of Discontent. How does such change actually occur? We see four essential steps. First, there must be **leaders** that lead according to the needs of the networks in which they are stationed, as opposed to a dictatorial order serving the interests of the powerful. Rain or snow is made possible by dust particles around which moisture accumulates; and when as change in temperature changes precipitation can occurs. This process is called nucleation—the formation of a self-organizing entity around the dust. This report is designed to do this. We aim to provide a remedial focus for the discontent now sweeping the world; from the occupy movements, those oppressed by dictatorships, those whose lives are wracked by crushing poverty, and the middle class that has been ravaged by the economic crisis.

Second, we must recognize the impotence of those in power. Spheres of influence within a culture are stratified into gradations of prestige or status. It is possible to identify the institutions, groups and even individuals located in the nucleus of cultural prestige and therefore influence - think specific universities, media sources, industry associations, corporate leaders, think tanks, religious leaders, and certain public figures. Around that nucleus is a larger centre with a greater number of 'members, but with relatively less influence than those in the nucleus. Such status gradations ripple outward to the outermost periphery of the culture, something like a dartboard. (Hunter 2010) Because cultural change proceeds from challenges to the legitimacy of the ideas and 'moral systems' of the 'culture's leading gatekeepers' located in the nucleus, the impetus for change virtually never comes from them. Instead it comes from groups and individuals situated around it and emanates outward to the general population. Ultimately the goal is to redefine the dominant ideas and operations of the centre but that occurs as a result of broader penetration throughout the culture which has the effect of increasing the influence and prestige of the new leaders.

Third, there is power in matrices. The key is to build dense networks in overlapping social and cultural spheres that work together for common cause for a sustained period measured in decades, not years. "When cultural and symbolic capital overlap with social capital and economic capital and, in time, political capital, and these various resources are directed towards shared ends, the world, indeed, changes." (Hunter 2010) It is precisely such dense networks - deliberately constructed - that propelled the 'neoliberal turn' in Western nation-states.

Many factors mitigate against the development of dense overlapping networks that might similarly propel a counter 'ecological-ethical turn', the most significant being the failure, so far, of progressive thinkers across civil society to identify a common cause. Progressive social movements are fragmented if not competitive, even antagonistic. All, or nearly all, the elements are there but they are not yet networked in a way that exerts the degree of influence commensurate with the change that is needed. This situation makes the need for a new integrative counter-discourse around which all progressive change agents can coalesce, all the more urgent.

Fourth, we must be prepared for struggle. Structural change occurs when the dominant paradigm is delegitimized either in the wake of systemic crises and the rising influence of a

⁹ This section draws substantially on the work of Janice Harvey.

challenging paradigm. Vested interests will defend their ideological and institutional terrain against challengers. Abolitionist Frederick Douglass warns against shrinking from the struggle: “Power concedes nothing without a demand. It never has and it never will. If there is no struggle, there is no progress. Those who profess to favour freedom yet depreciate agitation, are men who want rain without thunder. They want the ocean without the awful roar of its many waters.... It is not light we need, but fire; it is not the gentle shower, but thunder. We need the storm, the whirlwind, and the earthquake.”

ⁱ Brown, P. and Garver, G. *Right Relationship, Building a Whole Earth Economy*, Berrett-Koehler Publishers (2009)