DISCUSSION DRAFT

Ethics and the Human Enterprise in the Anthropocene Age— Evolving a New Understanding of the Morally Right and How to Get There

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February, 2016 (v 6)

INTRODUCTION

In the first decades of the 21st Century those working to assure that earth continues to be a viable home for humanity as well as for all other life have been in a crisis regarding their purpose and direction. This is a departure from the last century and a half when the giants of conservation and environmental protection--- personalities such as John Muir, Rachel Carson, David Brower come to mind--- were certain of their cause and the actions needed to sustain it. Whether focused on creation of great parks in the 19th century or cleaning the air and water in the latter quarter of the 20th century, there was clarity of purpose and much apparent success, especially in the United States and Western Europe, but also elsewhere in the world, particularly for nature protection. Yet in this first quarter of the 21st century a larger sense of unease has overtaken the cause of global conservation. There is an emerging sense that while a few battles have been won over the past decades, overall the fight to safeguard the vital fabric of the earth is being lost.

The apparent success of the recent Paris Climate Conference offers some hope that the complex conservation issues facing society are capable of positive resolution, but even the most optimistic participants in that process acknowledge that the Paris Agreement is only a first step in the right direction and that real success will only be able to be measured in decades to come. This is not to belittle what was achieved, which reversed the failures of earlier climate negotiations, but simply to recognize that resolving the complex scientific, economic, social and legal issues at play among 195 nations in order to begin a true trajectory towards a carbon free energy economy is neither a simple task nor certain of success. And, the apparent complexity of the carbon question is magnified many times by other deep global challenges.

In order to build on the results of Paris and to begin to overcome the broader sense of conservation failure, it is essential to postulate a vision for the earth that, if achieved, would define success. There are many such visions but they have in common the shared view that the earth must be sustained so that it is a hospitable place for habitation by humanity for countless future centuries. Many would argue that the idea of “habitability” embraces a spiritual quality that goes beyond the merely physical, although the latter is certainly essential. Thoughts about the nature of the “habitable” earth have ranged from the living earth concept (Gaia) where earth is actually considered as a fully integrated living organism to much more mechanistic ideas grounded solely in the bio-physical sciences. Parallel to, but not necessarily dependent on, these varying perspectives about the nature of the earth has been the emergence of

significant differences of opinion about the place of people in nature and their resultant duty of care.[1]

In this paper I argue that the nature of the environmental crisis facing humanity is significantly more fundamental than was appreciated in the latter half of the last century. In order for society to successfully address that challenge, sweeping changes will be needed in our systems managing the conduct of science, global governance, and the allocation of financial resources. Ultimately, I suggest success in this daunting challenge will come about only through a revolutionary expansion of our generations' sense of those to whom we have ethical obligations---namely future generations.

THE CURRENT ARC OF HISTORY

The arrival of the Anthropocene Age[2] teaches us is that we do not have the luxury of continuing to debate the nature of earth and our role on it. We now know that the cumulative impacts of the presence of humans on the globe fundamentally degrade global processes essential to sustaining life. The most notable examples of this impact are associated with the dramatic increases in atmospheric carbon resulting from the energy requirements of our modern industrial society. Whether on land, in the sea or in the air, changes are being wrought that natural processes cannot resist and that will make the globe less habitable for its nine billion humans as well as countless other forms of life.

However, even beyond alteration of the carbon cycle, the human enterprise by virtue of its vast scale, scope and complexity is, over the course of a few decades, radically altering global chemical, physical and biological processes that have evolved slowly over millennia to produce the "habitable" globe. This is the Anthropocene Age. Over the past decade a group of scientists has emerged who approach these issues via a concept called "Planetary Boundaries." They argue that human actions are causing disruptions on a scale similar to the distortion of the carbon cycle in at least nine other important global processes. For three of these processes---not only the carbon cycle but also the nitrogen cycle and biodiversity richness--- they believe that current disruption is at a scale that will result in unavoidable degradation of earth processes necessary to sustain life on earth over the long term.[3i4]

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[1] One of the early and comprehensive discussions of the emerging challenges associated with human and natural world interactions can be found in "Gaia: An Atlas of Planet Management, editor, Dr. Norman Myers, 1984

[2] Determination of geologic ages is a task within the purview of the International Commission on Stratigraphy. While the ICS has not acted to accept the Anthropocene, the concept is in sufficiently wide use among scientists, policy makers and others to mark a new age in the human experience. The ICS will officially consider approval of the Anthropocene idea at the International Geologic Congress in 2016.

[3] The others (not all expressed as global processes) are chemical pollution, ocean acidification, ozone depletion, nitrogen cycle, phosphorous cycle, freshwater flows, land use change, particle pollution of the atmosphere. Rockstrom et al*., Nature* 2009

[4] A different concern is that of increasing resource scarcity and the Malthusian effect that will have on human well-being. This issue became highlighted in the environmental context as a result of a famous bet in 1980 between Julian Simon and Paul Ehrlich in which Ehrlich bet that the price of five commodities would increase in price by 1990, thereby indicating their increasing scarcity in a world of growing population and consumption. Famously Simon won the bet. Notwithstanding Ehrlich's perhaps misplaced

Dangerously, the human enterprise has failed thus far to evolve meaningful mechanisms for managing its new role as one of the fundamental forces determining how the earth functions. In fact, around the world, in the case of climate change, elements of society deny the science of this reality, duck responsibility on the basis of religious beliefs, put short-term economic benefit first, or simply believe that future generations will learn to live in the new reality. With respect to destruction of other vital earth functions, most people are unaware of the changes that are occurring, as in the case of the nitrogen cycle. or, they dismiss the loss of, for example, nature's biodiversity as unfortunate aesthetic changes necessitated by the demands of the modern world but with little fundamental importance. This failure to assume responsibility for our impacts will only be compounded as we increasingly distort the earth's natural processes. The current reality of the Anthropocene Age is that humans behave as if the values and norms of responsibility that were adequate for pre-industrial society are sufficient to guide humanities' collective behavior and resultant impacts even though those impacts now are equivalent to, or even exceed, any natural force.

In order to fully appreciate the scale of these human impacts, it is useful to compare the current loss of biodiversity---what Elizabeth Kolbert calls "The Sixth Extinction" in the title of her recent book---with prior mass extinction events. The last great extinction, which happened about 60 million years ago, resulted in the loss, among others, of the dominant life form on earth, the dinosaurs. It is thought this extinction event was triggered by the strike of a single asteroid in the vicinity of what is now the Mexican coast line, perhaps in combination with or even triggering massive volcanic eruptions and lava flows across the globe, some on a continental scale. Despite the apparent simultaneity of these events, in fact the loss of biodiversity took thousands of years to play out. In those millennia new forms of life evolved to fill the old gaps and new opportunities. In contrast, the loss of earth's rich life now driven by humans is happening on a scale of a mere few decades---a period of time so brief as to preclude most evolutionary processes.

Collective indifference to these facts must give way if human life on earth is to survive. Conservation actions in the past have been based on one of two overarching strategies, either to: (1) provide protection to highly valued resources (for example, parks for special places) or (2) limit human activity to reduce perceived harm (pollution standards to protect air and water). To address the current crisis, some suggest that what is now needed is more of the same but in much greater measure. For example, it is argued that at least thirty percent of the oceans should be set aside as marine reserves, thereby going far beyond the current 2 % level of protection. Yet, it is obvious that such action will do nothing to protect life in the seas from the ravages of ocean acidification---the marine manifestation of excessive atmospheric carbon. Similarly, the massive resistance of industry, along with farmers and homeowners alike, to curtailing the use of

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notion that decadal change would validate his views, The World Wildlife Fund has argued in its Living Planet Report, issued every several years for the past decade, that society is consuming earth's resources at a rate far in excess of what is sustainable and that has resultant destructive impacts on the fabric of the globe as a hospitable place for life on earth.

nitrogen and phosphorous fertilizers makes clear that no meaningful standards on limiting their application to farm fields and lawns are likely. (And, if they were adopted could a world of 9 billion people be fed?).

Upon close examination, the idea that boundaries and standards established by government could be adequate to limit the impacts of human activity at the scale, complexity and intensity they now occur, is almost quaint. It certainly seems inadequate when measured as a strategy to respond to current and future realities of the Anthropocene Age. In addition to the problems of ocean acidification and the widespread use of chemical fertilizers mentioned in the previous paragraph a few other examples illustrate the insidious and pervasive nature of the problems earth faces. The relatively innocent use and discard of man-made plastics results in their bio-accumulation throughout the environments. In one example of the harm they eventually show up in the guts of young pelagic birds, causing them to starve to death. Similarly, in our modern "better things for better living through chemistry" society, most chemicals find their way into the environment not as waste products but through their intended use. Yet, they may have severe and unexpected impacts such as, for example, changes in sexual function in a wide variety of species from fish to humans. The pervasive nature of the uses and impacts inherent in these few, among many examples, suggest it is simply too late to put the genie back in the bottle.

The consequence of this neglect to care for the survival of the very fabric of the earth will be an environment that is increasingly hostile to humans and all other forms of life. Humans may be especially vulnerable in this increasingly hostile world as we are no longer able to meet basic needs, such as air suitable to breath, water safe to drink and a climate able to support growing crops. The dystopian endpoint for this scenario is a world in which humans become extinct or at least dramatically reduced in numbers and quality of life. And eventually in this much altered world new life forms will evolve that are as different from the flora and fauna of today's globe as these are from that which populated the earth 500 million years ago.

A DIFFERENT TRAJECTORY

There is another and brighter path for humanity to follow.[5] We can chose to take responsibility for the fundamental changes we are making in the viability of global processes and begin to take action to manage those processes in their altered state so that the critical consequences of these alterations are avoided or mitigated. In the context of the debate over increased atmospheric carbon concentrations and climate change this has come to be known as global engineering and is highly controversial and, until very recently, even taboo as a topic for serious discussion largely because such a conversation would be tantamount to surrender in the struggle to de-carbonize the world's economy. Yet, if we are to assure the future viability of the earth for life, we will necessarily have to manage critical consequences of those fundamental processes

[5] Although a recent opinion piece in the New York Times by Adam Frank suggests that perhaps the reason we have been unable to detect any signs of extra-terrestrial life given hundreds of billions of planets where it could have potentially developed (The Fermi Paradox) is that technological societies inevitably hit a sustainability crisis and collapse. NYT January 18, 2015

which our activities alter. To achieve this, in the future the fundamental responsibility of the human enterprise will be to implement Earth Systems Management (ESM).[6]

In summary, ESM takes as a given that the human enterprise now operates at a scale which inevitably alters vital earth process so that they no longer operate singly or collectively to create a global environment healthy for life as we know it, and especially for humans. The new and dangerous functionalities of these altered processes are critical consequences. If the earth is to remain habitable, humans must act to manage these processes to avoid or mitigate these critical consequences. In the field of climate change practices that have been advanced include: releasing aerosols in the high atmosphere to increase its ability to reflect the sun's energy, fertilizing the ocean to increase its ability to absorb carbon from the atmosphere, and artificially whitening the Arctic to replace lost ice and thus enhance its ability to reflect solar energy All of these are designed to enhance the earth's ability to manage the increases in atmospheric carbon due to our carbon economy. Additionally, massive engineered systems can be imagined which would directly remove carbon from the atmosphere. Any or some combination of these "fixes" would involve enormous costs, resolution of complex scientific and policy questions and decision-making about risk and benefits on a global scale. The task becomes even more challenging when it is understood that the critical consequences are associated with a number of processes in addition to those of the carbon cycle.

The balance of this paper is predicated on the idea that humanity must embrace ESM as the defining quality of the human enterprise in the Anthropocene and that that can only happen if new ethical values are adopted by humanity which result in a radical transformation of how we govern ourselves and how we allocate our rich financial and technical resources. One could also argue that, if such an ethical evolution were to come about, that would be a driver sufficient to, in the near term, change the actual nature of the human enterprise so that its consequences would no longer result in irreversibly negative changes in vital earth processes, i. e., we would choose to live within the earth's given boundaries. In other words, humanity would exercise the humility to retreat from the Anthropocene age. Thus, humanity finds itself on the cusp of two great choices----embrace the Anthropocene and recognize the parallel responsibility for ESM or retreat from the Anthropocene thereby assuring that the human enterprise does not violate planetary boundaries and thus avoids critical consequences. Failure to choose one or the other path bodes ill for the future of humankind. Either choice will need to be built on the elements discussed below but as the arc of human history suggests that retreat is rare and moving forward into uncharted waters is the norm, the discussion has a focus on achieving effective ESM.

THE NEW ETHICS

Humanity must evolve a new understanding of ethically "right" choices in order to drive human behavior to reorganize the human enterprise to meet the challenge of Earth

[6] Brad Allenby has written extensively on a somewhat similar concept which he terms Earth Systems Engineering and Management. While he acknowledges the ethical issues around the deployment of projects, he does not address the necessity of an evolution in human ethics as a critical precursor.

Systems Management. Ethical values are essentially the human constructs that guide individuals and societies in identifying and choosing the morally right from the morally wrong choices. Aldo Leopold argued in *The Land Ethic*, written in 1948, that further ethical development of humankind depended on a greater awareness of the mutuality of dependence and survival in the relationship between people and nature, especially land and wildlife. The conservation/environmental movement of the latter part of the twentieth century was undoubtedly strongly influenced by this thinking and his ethical linkage of man and nature was at the base of many of the conservation successes of the twentieth century. Leopold went on to say: "An ethic may be regarded as a mode of guidance for meeting ecological situations so new or intricate, or involving such deferred reactions, that the path of social expediency is not discernable to the average individual….Ethics are possibly a kind of community instinct in-the-making."[7ii]

Leopold further discusses the central role of community in the formation of ethical values and noted that "All ethics so far evolved rest upon a single premise: That the individual is a member of community of interdependent parts."[8] In the Anthropocene, what now must be added to his thought is an expansion of the idea of community to include future generations so that the morally right is defined through them as well as by those now living on earth. We must form our ethical sense of responsible action today not by the world as we seek it to be for ourselves but as that world must be for its future inhabitants over millennia. A start to thinking in this direction can be found in the ideas developed over the past two decades about sustainable development. Yet, sustainable development is only an initial step as it embraces a duty to limit or control present human action but fails to include the affirmative responsibility to manage earth processes to assure the well-being of future generations.

Including future generations in the immediacy of our thought would force us to appreciate that we are merely at the beginning of the future and have an ethical responsibility to the people of the future for passing on an earth able to support them. Understanding and acting on that perspective would define key elements of morally right action today. At the core of that ethical responsibility will be to move from a focus on meeting current needs of humanity in a world where our choices are assumed to have little or no impact on the future viability of nature to making choices which puts the first priority on meeting the future needs of humanity, most importantly through the active management of earth systems to avoid or mitigate critical consequences as the basis of their well-being.

It might seem improbable that a new set of ethical values could emerge across all of humanity with sufficient rapidity to drive the kinds of substantial and radical real actions that must be taken in this century if ESM is to be undertaken in time to avoid some of the most dire impacts of our current course of action. Karen Armstrong in her biography of the Buddha speaks of the period of the sixth and fifth centuries BCE as the Axial Age "when men and women <u>became conscious of their existence</u>, their own

[7] Leopold, A., The Sand County Almanac, 1949, Oxford, p. 202
[8] *Ibid* p. 203

nature and their limitations in an unprecedented way"[9]. Her discussion of the Axial Age does seem to suggest that even several thousands of years ago new ideas could sweep across the world in a relatively short period of time, and thereby change the course of human thought and action. The speed and clarity with which ideas can be built and communicated in the age of the internet makes it at least theoretically possible to imagine that new and radical ideas could take hold across much of the world with great speed. With effective thought leadership this process would only be further amplified.

For this to happen it is probable that some form of forcing factor will be required. One such forcing factor could be the political leadership of a single individual or small group of like-minded thinkers. Another might be the development of the will for change, aided by the power of the internet, in a sufficiently significant portion of the global population so as to drive new choices by political and economic leaders. But, perhaps the most likely and effective driver of change will be a catastrophic event affecting significant numbers of people and clearly associated with a failure to manage earth system change. Alternatively, and more hopefully, the success of the Paris negotiations may teach that government leaders can make tough and far reaching decisions when confronted with very strong science in combination with an increasingly robust series of small but collectively unexpected catastrophes such as drought, fire and flooding.

THE ELEMENTS OF EARTH SYSTEMS MANAGEMENT

The ethically driven choice of future care through Earth Systems Management demands a radical change in what people do and why they do it as compared with the current human enterprise.

The demands of ESM will exceed in complexity anything people have done before, including the entire mosaic of the industrial revolution and its spread across the globe. This change will have at least the following three components.

Science

Earth Systems Management will need to be predicated on a fundamentally strong scientific understanding of earth processes at critical risk and options for managing the processes themselves to eliminate the risk or to manage the critical consequences. While climate change and its effects on the viability of the globe have been increasingly well studied over the past decade, this is less true for many other issues such as biodiversity loss or changing land use patterns. Urgent attention to the global implications of these changes is needed in order to understand clearly how they affect earth viability and what interventions might modify those adverse impacts.

For the past twenty five years the Intergovernmental Panel on Climate Change has provided a valuable learning experience in how to integrate scientific knowledge about fundamental earth processes. Recently the United Nations General Assembly has initiated a similar process for the world's oceans. The lessons learned should be applied to a new global research program targeted at understanding the most fundamental forces destroying the integrity of earth systems and appropriate

[9] Armstrong, K., Buddha, 2001 Penguin p. 11

mechanisms to intervene to restore or replace the functions of those processes. This new global program should integrate the ongoing efforts on climate and oceans and at a minimum should consist of a directed scientific research program, substantially funded by governments, with specific outcomes that can be acted upon. This research program should be carried out with the same urgency and intensity that was associated with development of the atomic bomb through The Manhattan Project during World War II.

Governance

There will need to be renewed and more effective mechanisms for decision-making among governments and society about the deployment of Earth Systems Management actions and the allocation of costs and benefits therefrom. Many Earth Systems Management interventions will require massive, widespread and long term physical intrusions into the earth's terrestrial, atmospheric, and oceanic systems. New governmental institutions for deciding on and carrying out such interventions will need to be developed. In addition, existing organizations will need to have substantial changes made to their authorities. For example, one could foresee that the existing system of Regional Seas Agreements for collective attention to the oceans would be substantially strengthened in order to deploy ESM actions to reverse the process of ocean acidification.

There will be serious social and economic costs and benefits associated with many Earth Systems Management actions. International mechanisms will need to be designed that are able to identify these and make decisions about the equitable distribution of these impacts among countries and peoples. One can even imagine serious aesthetic impacts from certain strategies for which communities would seek compensation. For example, massive fish farming at the mouths of rivers to utilize excess nitrogen and phosphorous and thus prevent ocean dead zones might reduce the touristic value of certain areas.

This suggests that the central role of the United Nations system as a collective force designed to prevent wide-spread armed conflict could be complemented (or even replaced) with a responsibility to advance international mechanisms for deployment of ESM. Central to achieving this would be a merger and reform of some UN bodies such as the United Nations Environment Program and the United Nations Development Program. Merger of these two entities and establishment of a broader charter for their governance and action to oversee ESM would require substantial reform but the imperative of the Anthropocene might provide the rationale for what has up until now been considered a difficult undertaking with doubtful benefits. Again, such actions might seem remote, but as the urgency of the negative implications of the Anthropocene become more apparent, sweeping reform, the need for which is now recognized by many observers, may suddenly be seen as an imperative.

To restructure these existing international governance bodies, consideration should be given to the unique and interesting model of the International Labor Organization (ILO), one of the UN System's oldest bodies. The ILO is governed not just by national

governments but also by the business community and organized labor through a tripartite structure giving each interest an equal voice. While decisions of the ILO are not binding the standards setting and practice review process are a viable system for international governance which involves the interests of non-governmental actors on a footing equal to that of governments. In the case of a merged UJDP/UNEP entity the successor entity, The Earth Systems Management Body (ESMB), would be governed by interests beyond governments, such as scientists, and the environmental and social development communities, thus assuring an appropriate balancing of the complex range of competing interests.[10]

Finance

Finally there will need to be new mechanisms for marshalling the necessary financial resources to implement Earth Systems Management projects. Fundamentally, this will only be possible through capturing a substantial portion of global financial resources. There have been a number of proposals in other contexts which seek to capture sa modest proportion of global wealth for a range of purposes. One example is the proposal for a .15 % tax on international financial flows which would be used for funding poverty alleviation projects. These ideas provide a useful starting point for examining mechanisms but none is sufficiently robust to generate the funds likely necessary for ultimately financing maintenance of earth's systems. [11]

However, as the magnitude of the Earth Systems Management undertaking becomes manifest, it will be apparent that greater resources will be required. In a world where new ethical values are driven by care for the globe in order to sustain future generations it is probable that consensus will emerge that a significant part of the very large spending on military forces and of the very large accumulations of private wealth should be allocated for Earth Systems Management. This will require a significant restructuring of financial resource flows and the examples mentioned in the footnote to the previous paragraph my be a starting point. The economies of the Scandinavian countries may offer models for a future global economy broadly functioning along free enterprise lines but with reductions in large accumulations of private wealth and wasteful military spending, neither of which is even essential to the functioning of the current economic model.

[10] In contemplating the role for government in carrying out ESM, history offers examples. One of the validating functions of government in China over time has been the extensive management of water to assure its availability across a large country where natural distribution is not even. Similarly, the Tennessee Valley Authority was based on the intensive management of an entire river system covering about 15% of the entire country for social and economic benefits. Each has cautionary elements, but illustrates the capacity and legitimacy of government to play the central role in ESM.

[11] Building on earlier ideas of Keynes and Tobin, Edgar Feige proposed a global financial transaction tax in 1989 which at a rate of 01% was estimated to generate over 200 billion dollars. A number of national governments now impose such taxes. Such a tax is also now the subject of discussion in the U.S. 2016 Presidential campaigns, at least on the Democratic Party side.

Additionally, consideration should be given to whether reform of global financial institutions within The World Bank system, the International Monetary Fund or the Regional Development Banks would help to finance and manage large scale Earth Systems Management projects.

FINAL THOUGHTS

Is it too late? There are three dimensions to this question. The first has to do with one question explored in this paper which is whether a development of a new ethical perspective can happen in a relatively short period of time. The second has to do with whether society can make the decisions to reform existing institutions and develop new ones essential to earth systems management with sufficient rapidity to provide essential management. Finally, have we passed the point where any intervention can in fact begin to manage for the essential balance of the globe's processes.

The clear answer at this point in time is that we do not know. The science of understanding the conditions we are creating is too undeveloped as is an understanding of the responses and technologies which need to be deployed for Earth Systems Management. However, even in the face of that uncertainty, the consequences of inaction would appear to be so severe that there is no choice but to forge a new trajectory--- a trajectory that is defined by placing the well-being of future generations at the core of our ethical values.

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