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Pillars for a flourishing Earth: planetary boundaries, economic growth delusion and green economy

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In the hue and cry about the 'green economy' leading up to Rio + 20 a number of simple points have been neglected. First, the purposes of the economy have been too narrowly conceived. Second, the role of demand management is vastly underplayed. Third, the assumptions about the nature of reality are inconsistent with contemporary science. Fourth, it is mired in a complex discourse about measurement, which fails to even recognize that all economies are dependent on living within Earth's biogeochemical constraints. Fifth, it uses a conceptual framework laid down in the 18th century and tries to apply it to the Anthropocene. The simple, but to many unthinkable, fact is that you cannot get to a flourishing or even sustainable Earth if you start with the assumptions of neo-classical economics. This is not to say that some of the neo-classical tools are not useful, but that they must be deployed in a framework that it does not and cannot supply.

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'The present technological age has seen an impoverishment in the historical relationship between human beings and nature. Nature has been treated as a commodity that exists largely for the benefit of people, and all environmental problems as solvable with a technological fix. Loss of biodiversity, desertification, climate change and the disruption of a number of natural cycles are among the

costs of our disregard for nature and the integrity of its ecosystems and life-supporting processes. As recent scientific work suggests, a number of planetary boundaries are being transgressed and others risk being so in a business-as-usual world.' UN Secretary General's report to the UN on Harmony with Nature

Introduction

The economic crisis is here to stay and the current economic reproduction model seems to be entering a period of prolonged stasis, with both foreseen and unexpected events [1,2]. Examples of failures of the growth paradigm abound in the scientific literature and even on occasion the media; and to a large extent have become general public knowledge. 'Yet the imaginary of continuous and unlimited growth has not lost its prominence, and, repackaged in Keynesian or neo-liberal austerity versions, is offered once again as the only way out of the debt crisis' [3].

However, the crisis cannot be limited to the economic and social spheres, but is embedded in an ever-deteriorating natural environment [4]. In addition to financial debt there is vast and rapidly growing ecological debt. The rapid dwindling of biodiversity during the last century at nearly all geographical locations, represents not only an irreversible impoverishment of our human experience, evolutionary inheritance and options, but also the loss of essential contributions to human well-being now and, most notably, for generations to come [5]. Global attempts to reduce the rate of biodiversity and ecosystem function loss have so far mainly failed and underline the lack of adequate responses by our societies and their reigning international institutions. The atmosphere is being changed by the emissions of gases that overwhelm to ability of the natural systems to absorb them. The chemistry of the oceans is being changed, while many fisheries are being depleted, perhaps past the point of recovery. Here, of course, we mention only a small sample of the evidence in the decline in life's prospects.

Despite this evident failure to redress human-driven environmental degradation, several attempts have been made to put mechanisms in place aiming to value ecosystem services and internalizing the costs of 'externalities' [6,7]. One such mechanism is the 'green economy',

defined by many organizations as an economy that can ‘result in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities’ [8]. In its simplest expression, a green economy is low carbon, resource efficient, and socially inclusive. In a green economy, growth in income and employment is driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services [9].

The above are examples of a rhetoric that seems to comfortably accept technological solutions to economic-socio-ecological problems. It contains a mechanistic understanding of the evermore-complex coupling of humanity and Earth’s ‘systems’ functioning. It must be recognized that efficiency increases accruing from technological innovations can become perverse incentives to consume more. This is called the Jevons’ Paradox [10]. However, rather than jumping to quick fixes we ought to be assessing the conditions required to address the direct drivers causing the rapid deterioration of our socio-ecosystems that we have observed and participated in over the past 100 years [11].

There is plenty of information about the causes, pre-conditions and benefits of economic growth, but practically no understanding about how we can maintain prosperity outside of the economic growth paradigm. We are obliged to carefully assess the conditions for an economy embedded in a flourishing Earth, since subscribing to the unreasonable position of unlimited growth, or blindly believing in technological miracles, are mere illusions that soon vanish when confronted with our ultimate thermodynamic reality. It is in the interest of our species as a matter of survival to collectively respond to this challenge by rethinking the goals of economics and its relation to the Earth’s limits [12,13].

In the pages below we present some initial concepts and relationships that will help define and build the pillars for this new collective venture, paying specific attention to environmental responsibility and social justice.

What the Economy is for¹

We have lost sight of the plain fact that there are many essential human goals and common goods that cannot be adequately discussed using the language of economics. This has made it difficult to discuss or even imagine the

¹ This section is derived with substantial changes from a section of ‘Enabling a Flourishing Earth: Challenges for the Green Economy: Opportunities for Global Governance,’ by Klaus Bosselmann, Peter G. Brown and Brendan Mackey. Forthcoming in the *Review of European and International Environmental Law*. Blackwell Publishing. The argument also draws on Peter G. Brown and Geoffrey Garver’s *Right Relationship: Building a Whole Earth Economy* (San Francisco: Berrett-Koehler Publishers, 2009).

complexity of human aspirations and duties. As a result we risk becoming blind to the erosion of those common purposes and goods that fall outside the domain of market economics. We need an economic framework in which the full panoply of human purposes can find their home. We believe that the Earth Charter² provides a crucial point of reference for understanding these goals.

We are concerned here with common goods that cannot be sensibly privately owned and traded on markets: common goods such as fresh water, healthy soil and clean air. The oceans, the atmosphere and diversity of life are essential conditions for human life and well-being. If a public goods regime is to avoid a ‘tragedy of the commons,’ it must succeed in coordinating norms of behavior that preserve and enhance the commons [14,15]. Whereas private ownership can secure investment in narrowly delimited goods where immediate return is foreseeable, global common goods regimes will be characterized by underinvestment if private ownership alone is relied upon. Approaches to incorporating such goods into economic analyses based on neo-classical economic theory include: (i) privatization and commodification of some aspect of the good to create a real market where it is traded; (ii) generating a shadow price through an imaginary market and sampling citizen’s hypothetical ‘willingness to pay’; and (iii) estimating the cost of substituting alternative production sources for the good.

However, we reject these approaches for those categories of common goods which by their nature defy commodification, for which no evidence exists that their integrity can be protected through market-based instruments, where pressing issues of social and economic justice occur, as spelled out in Earth Charter Principles 9, 10, 11 and 12, or where their non-market value is already established and recognized by international norms, law and institutions.

Planetary life support systems

Recent scientific advances highlight the need to carefully consider the long term, aggregate impact of human activities on those planetary processes which constitute our environmental life support systems [4,16]. Science also now teaches us that Earth system processes are dominated by non-linear feedbacks and complex interactions between the living biosphere (species, ecosystems) and physical and chemical processes. We know now that the climate system is not just an atmospheric phenomenon, but involves exchanges of gases and energy between the atmosphere, oceans, land, and lithosphere. Landscape ecosystems and watersheds not only provide many of the essential conditions and resources for sustainable livelihoods such as

² The Earth Charter is a declaration of fundamental ethical principles for building a just, sustainable and peaceful global society in the 21st century and was launched as a people’s charter in 2000 by the Earth Charter Commission.

fresh water and fertile soils but also are tightly coupled to global scale processes and climate change. Protection of planetary life support systems is clearly a new category of scientifically defined common goods that demands a new kind of governance response, as articulated in Earth Charter principle 5: *Protect and restore the integrity of Earth's ecological systems, with special concern for biological diversity and the natural processes that sustain life* [17].

Sacred goods and cultural fiduciary obligations

The Earth Charter notes that: The protection of Earth's vitality, diversity, and beauty is a sacred trust. This concept of 'sacred' is fundamental to many if not most human cultures and societies. The meaning, significance and geographical expression of the sacred are in the main traced to faith traditions, including the world's major religious and Indigenous spiritualities. However, there is also a secular sacredness which is manifested in laws and treaties, and, among other things, values related to national identity, for example, war memorials. Cultural and natural sites of universal heritage value have been recognized by the international community through the World Heritage Convention and reflect religious, spiritual and secular sacred value. As noted in the Convention's operational guidelines: 'The cultural and natural heritage is among the priceless and irreplaceable assets, not only of each nation, but of humanity as a whole. The loss, through deterioration or disappearance, of any of these most prized assets constitutes an impoverishment of the heritage of all the peoples of the world. Parts of that heritage, because of their exceptional qualities, can be considered to be of 'outstanding universal value' and as such worthy of special protection against the dangers which increasingly threaten them.'

Achieving fairness and equity

Much effort has been taken to reduce absolute poverty, especially in developing countries. While this is a necessary effort which must be continued with renewed vigor, there must be equal emphasis on reducing inequalities or relative poverty. UNEP has defined a Green Economy as one that results in 'improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities' [8]. There are several underlying reasons why sustainability cannot be achieved without ensuring poverty reduction *and* much more equitable distributions of income and wealth.

Inequality itself drives both excess consumption and population growth. Class and status enable and motivate overconsumption. 'A very important part of what fuels consumption. . . is status competition — keeping up with others, maintaining appearances, having the right clothes, car, housing, education, etc., to compare favorably with others. All these pressures are intensified by greater inequality' [18].

Inequality promotes conflict both within and between societies [19,20]. Much of the recent turmoil witnessed across the world can be attributed to the rising inequality across different segments of the population. Social turbulence in the Middle East, parts of Europe and Asia, and even the United States all point toward a growing recognition of the injustices of unequal distribution of wealth and access to resources. 'The data indicate that economic disparity and geopolitical conflict reinforce one another,' according to the World Economic Forum [21]. Given conflict between groups or nations, especially when related to resource use, the prospects for achieving sustainable resource use goals are greatly reduced.

Finally, inequality blocks progress toward cooperative solutions and sustainability [22]. No one wants to cooperate and make sacrifices for the common good when they know that others will receive most of the benefits. 'Economic disparities are also seen as contributing to a broader process of global social fragmentation. . . Globalization has led to different groups within countries having divergent economic interests, undermining a sense of broader national solidarity' [23]. Trust and willingness to help others is diminished with higher levels of inequality. 'Greater inequality makes people more self-serving and individualistic. That is why it is divisive and socially corrosive. . . People are unlikely to change their way of life and make cuts if the rich are allowed to produce 10 times the carbon emissions of the poor. . .' [18]. Moving toward equity will make urgently needed collaborative efforts possible, including negotiations, treaties, multilateral governance approaches, aid for sustainable development, cooperation on green economy projects and infrastructure, and diversion of funds away from conflict toward needed changes.

Recognizing the role of merit

There are many areas of life where the test is qualification not price. Being a physician is not something that one can buy independent of training and expertise. Holding a seat on the international criminal court depends on knowing the law, procedure, and possessing judgment. It is of vital importance that the governance oversight of common goods be based on non-market criteria. There is a significant gap in global governance with respect to environmental common goods, and that gap should be made up through administrative processes linked to scientific expertise and a deep understanding of humanity's goals as set out in the Earth Charter. These are attributes that the market alone cannot supply.

Underrating demand management

Just shifting the supply curve is insufficient. Internalizing the externalities increases the price of the good but then technological innovations to improve efficiency will again reduce the price and subsequently increase demand. This is not a sustainable strategy. Efficiency increases accruing

from technological innovations can become perverse incentives to consume more. Therefore, rather than jumping to quick fixes we ought to assess the conditions that are required to address the direct drivers such as excessive consumption and population growth which are causing the rapid deterioration of our socio-ecosystems that we have observed and participated in over the past 100 years. A green economy ought to tackle these direct drivers head on if it is to make a difference and to provide a way out of our present predicament. Therefore, rather than just perceiving the green economy as a green technological fix, it must be rethought and seen as the next major social transformation process following the industrial revolution. Key elements of such a transformation process will be a challenge for our existing economic frameworks and insights need to be found to build a future society, which lives within planetary boundaries in an equitable manner.

In parallel with technological fixes, we must also move to influence the demand for goods, and this requires us to have a better understanding of human behavior and real needs. The standard assumption of non-satiation is misleading, even false, and recent psychological studies show a disconnect between well-being and material goods. Emerging results from behavioral economics and sciences suggest the possibility of influencing demand curves through social outreach and dissemination programs providing information on the social implications of individual's actions and the call for collective responsibility for achieving global sustainability [23,24].

Mechanistic assumptions

The challenge for humanity in light of growing population and dwindling resources will be to find innovative ways to reduce resource use and live within the limits of the critical planetary boundaries. History has shown us the powerful forces of science and technology and there is no doubt that these fields will continue to be critical in our future. But we must understand that societies are complex organic systems, not easily broken down into parts.

Societies are organic

Science and technology must be seen through a new lens. Recent studies show that the industrial revolution was as much a social transformation as a technological process. Non-negotiable effects of new technologies and their relation to sustainability too often focus on specific commodities and habits (green technology, turning off lights to conserve energy, recycling) rather than on the invisible routines, conventions, and habits that have far greater effects. 'Eco-modernising' society, in this view, is a far more difficult project, one that thus far has failed to take into account the processes by which new technologies enforce conventions. This model has been successful in the countries where technology was developed but less so in countries which were primarily recipients of technology.

The dichotomy between the pace of technological change and social changes has been one of the key factors causing social disruptions in society.

From sectors to systems

Proposed approaches toward the building of a green economy adopt a sectoral approach, with technological advances in selected economic sectors expected to take the lead in future economic growth. However, computable general equilibrium economic models, as well as multi-sectoral economic growth models, show how changes in one sector affect other sectors. Moreover, recent approaches such as the Millennium Ecosystem Assessment [5] have shown how many ecosystem services are clearly inter-dependent, and a change in one clearly affects the supply of other services. For example, the growing use of biomass for fuels has caused a significant shift away from food production, causing a loss of food security for vulnerable and marginalized people [25]. In addition, the conversion from fossil to agrofuels may cause a loss in biodiversity when forests are cleared for agrofuels [26]. Increased demand for water will cause an increase in the price of water, again forcing vulnerable and marginalized groups into further destitution. These inter-sectoral linkages suggest that we need to move away from the traditional sectoral approach to the green economy to a coupled socio-economic-ecological systems approach to economic planning under the green economy.

Fiddling while Rome burns

We have been measuring societal success on the basis of one production indicator for more than half a century. Today, there is a wide consensus in the literature that we should go beyond GDP to measure well-being in a more comprehensive way. Some of the limitations of GDP are caused by the failure to distinguish between costs and benefits. Other shortcomings relate to the lack of information on other important dimensions of well-being which are outside of the market sphere; for example, fiduciary goods, fairness, leisure activities, ecosystem functions, social networks, and the like. Hence, production alone does not provide an adequate basis for the measurement of well-being, given the great variety of factors that determine it. Despite the many compelling critiques and reasons to abandon GDP, not only recently but present for a long time now in academic and non-academic circles, one question still remains: why is there so much resistance to the critiques of GDP and to the adoption of alternative macroeconomic measures of societal well-being?

But what is ignored in this rather tepid discourse is that whatever measure we come up with must recognize that the economy is fully embedded in the Earth's biogeochemical systems. Any remotely adequately system of measurement must *start* with how the economy relates to

the Earth's life support systems. Of course, there is nothing new about this insight. It has been the principal message of ecological economics since at least the time of Nicholas Georgescu-Roegen [38].

But the message has been assiduously avoided since to accept it would be recognized that the dominant economic model is fundamentally misconceived, and that the metaphysics on which it rests is without support in the contemporary scientific understandings of the world. As Robert Nadeau has shown the premises of neo-classical economics not been systematically revised in light of the last 200 years of science [27]

Economics for the Anthropocene

There are some variations of the economic growth paradigm which pretend to be alternatives, but are generally green-washing versions of environmental economics. The movement to impose market values and increase profits by expanding the frontiers of capitalism is resisted by a countermovement (as Karl Polanyi explained in *The Great Transformation* in 1944 [28]) to protect nature and humans. The protagonists are sometimes labor unions (caring for health and safety at the work place) or nature conservation societies (caring about wilderness or threatened species). They are increasingly environmental justice organizations (EJOs), or indigenous groups, citizens and peasant groups, and women activists. They deploy their own values against the logic of the market. At times, they mildly ask for monetary compensation for damages but at other times they demand respect for human rights to life and health. They insist on indigenous territorial rights, they claim that mountains, rivers or some trees are sacred and cannot be traded-off. EJOs are potential allies to environmental groups in rich countries that criticize the obsession with GDP growth.

Some of these EJOs take the form of the Degrowth movement [29], which partly originates from ecological economics, a transdisciplinary field born in the 1980s [30–35] from a confluence of interests between ecologists who studied the use of energy in the human economy, and dissident economists [36–38] who followed the teachings of Georgescu-Roegen [38,39] and Boulding. However, these groups are far from homogenous, for instance, steady state economics tends to focus on the physical components of an economy and might be said to focus more on the limits to growth than the degrowth 'schools' that place more emphasis on reduction in consumption [40]. A central message of these groups is that we have entered the Anthropocene with conceptions that did not even work in the relatively placid Holocene. Indeed, the current economic system was certainly a factor in hastening, if not precipitating, this tragic, perhaps fatal, transition. These failed economic conceptions and their political and social corollaries distracted us from the monumental changes we have induced on our planet.

Re-thinking the economic process in the light of ecological economics is a step that will help to move us toward a civilization worthy of respect.

Conclusion

The authors of this article share a sense of disappointment after the failure to achieve the UN goals of 1992 of halting biodiversity loss and putting in place an effective international system of reductions of greenhouse gases emissions. The fanfare on the so-called Green Economy is loud but not convincing. While in 1992, the Rio conference had 'sustainable development' as its main banner, in 2012 the slogan is the 'green economy'. Cynics might be forgiven for wondering how many more slogans are needed before governments accept that real change is needed.

We have argued that responsible rethinking of the economy must have at least five elements. *First*, it must recognize that the economy exists to serve human values such as those set out in the Earth Charter. In our era an economy must be judged by its ability to serve human values while respecting and being constrained by the limits of Earth's life support systems and the well being of other species. *Second*, technological efficiency must be coupled with demand reduction if it were to avoid stimulating further consumption. Economic instruments, participatory bottom up incentives, and much greater equality must be introduced to capture the efficiency gains from technological innovations and redirect gains to ecological restoration. *Third*, technology and investment in science must be approached as a social transformation process rather than just as technology transfer; and ecology, economics and society must be understood as one system. *Fourth*, any system for measuring economic success must recognize the characteristic and limits of the Earth's life support systems: our planet is an autarkic system with finite boundaries. *Lastly*, we must embrace a process of decolonization of our minds, and move beyond a way of thinking about the economy which demonstrably ill serves us in the stormy Anthropocene.

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