



## **Book Review — Bankrupting Nature: Denying Our Planetary Boundaries**

### *A Report to the Club of Rome*

By **Anders Wijkman** (Co-President, Club of Rome; Senior Advisor, Stockholm Environment Institute) and **Johan Rockström** (Executive Director, Stockholm Resilience Centre).  
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It is sometimes said that you can't tell a book by its cover. Or by its title, or sub-title. This 33<sup>rd</sup> Report to the Club of Rome is a case in point. The sub-title indicates that "planetary boundaries" is the major theme, but only 13 pages are devoted to exploring this essential concept in Chapter 5, while many other related and not-so-related ideas are also discussed.

The broad integrative theme herein is to "critically examine the relationship between human beings and nature, and the threats we pose to the complex natural systems on Earth that are the preconditions for all life." The basic premise is that "*the living biosphere and natural resources (are) the prerequisites for prosperity and development in the future*"— a perspective that "is obvious to most natural scientists" (but not to the general public). Moreover, "humanity is facing a critical reality: an abundance of scientific reports clearly points out that we are very close to a saturation point, where the biosphere cannot handle additional stress...all signs reveal that our lifestyles and consumption patterns are on a violent collision course with nature." (pp1-2) We thus need a "proper balance sheet" for the planet to replace the aggregate GDP measure of production.

Before getting into the details, a few words about the two distinguished authors, in addition to the affiliations mentioned above. Anders Wijkman is also a Fellow of the World Academy of Art and Science and a member of the Swedish Royal Academy of Sciences. He has been a member of the Swedish Parliament and the European Parliament (1999-2009). Wijkman served as Assistant Secretary-General of the UN, Policy Director of the UN Development Programme, and Secretary General of the Swedish Red Cross. Johan Rockström is Professor of Natural Resource Management at Stockholm University, and co-chair of Future Earth, an international research initiative on global sustainability. He was the lead author of a major September 2009 article in the prestigious UK journal *Nature*, which introduced the concept of planetary boundaries. (J. Rockström et al., "A Safe Operating Space for Humanity," *Nature*, 461, 472-475. Also see J. Rockström and 28 others, "Planetary Boundaries: Exploring the Safe Operating Space for Humanity," *Ecology and Society*, 14:2, 2009, article 32; download at [www.ecologyandsociety.org](http://www.ecologyandsociety.org)).

## 1. PLANETARY BOUNDARIES, IN BRIEF

“The influence of human activity may have so altered the world that we may have entered a new geological age, the Anthropocene.” Life on Earth depends on the intimate interaction between the troposphere, the stratosphere, the biosphere, the geosphere, and the cryosphere. “It is not only greenhouse gases, with their impact on climate, that have shown an accelerating and negative trend over the past fifty years. The same curve of development, which is often likened to the blade of a hockey stick, also characterizes most natural systems.” (p37) The evidence is now clear: since WWII, “the pressures on key ecosystems have increased exponentially.” Major indicators are higher levels of CO<sub>2</sub> in the atmosphere, large dead zones in coastal areas, melting sea ice and permafrost, ocean acidification, rising sea levels, biodiversity loss, land use changes, soil degradation, and growing consumption of fresh water and energy by a growing global population.

Awareness of climate change risks is “reasonably large” today. But an understanding of interactions between the atmosphere and the biosphere is “much more limited.” The Earth is a complex and self-regulating system with an inherent resilience to meet different types of disturbance. But as the atmosphere, oceans, and terrestrial ecosystems are subject to negative influences caused by humans, the resilience changes. “We need to acknowledge the risk of surprises, tipping points, or threshold effects.” (p38)

“The concept of planetary boundaries provides an opportunity to develop a game plan for human development on a planet that has limits.” The concept involves **nine biophysical processes**: 1) climate stability; 2) ozone depletion; 3) ocean acidification due to rising temperatures (thus reducing ocean ability to absorb CO<sub>2</sub>); 4) biogeochemical loading (nitrogen and phosphorus cycles); 5) biodiversity loss; 6) degradation of land resources; 7) over-exploitation of freshwater resources; 8) pollution from toxic chemicals; and 9) atmospheric aerosol loading (soot particles, nitrates, sulphates). Humanity has already exceeded three of the boundary limits on the safe side of unwanted consequences, as concerns climate change, loss of biodiversity, and the global nitrogen cycle (adverse effects of all excess nitrogen are extremely serious, e.g. air and water pollution and depleted oxygen in water or eutrophication).

The critical conclusion is that “*climate change must be viewed in a broader context than hitherto*. The close interaction between the climate system and many ecosystems makes it impossible to focus on greenhouse gas emissions alone.” No one knows exactly where the various threshold effects are, and how other biophysical processes will respond. But “if the oceans, forests, and soils gradually lose their capacity to absorb greenhouse gases—going from carbon sinks to being carbon sources—the consequences will be extremely serious.” (p.48)

## 2. THE BROADER ARGUMENT

As indicated at the outset, the Chapter 5 discussion of planetary boundaries is relatively brief. The other 18 chapters are highly varied. The more important ones are briefly summarized:

**Agriculture.** To adequately feed a growing world population, food production must increase

70% by 2050, a task that is made difficult by climate change (e.g., crop yields in tropical regions could shrink by 25-50% over the next 50 years due to warming). Agriculture is “the world’s single largest contributor to climate change and loss of biodiversity... (and) the world’s single largest consumer of both water and land. It is also the key driver behind the use of nitrogen and phosphorus.” (p52) Industrial agriculture must be reformed by increasing productivity on existing farmland, technological and biological breakthroughs (we must be open to GM crops—and their risks), developing plow-free cultivation and perennial grains that generate carbon sinks and retain water in soils, exploiting rainfall more efficiently, better nutrient management through organic farming, and promoting biological diversity that provides resilience.

**Energy.** A successful energy transition must involve 1) massive development of renewable energies; 2) advanced energy systems with carbon capture and storage for both fossil fuels and biomass (although there are doubts about CCS; very few pilot projects have been established so far) 3) removal of fossil fuel subsidies (37 governments spent \$409 billion on such subsidies in 2010, according to the IEA); 4) most importantly, radical improvements in energy efficiency, especially in end use; the technology is already on the market to reduce energy consumption to one-fifth of today’s level, as shown by Ernst Ulrich von Weizsacker (Co-president, Club of Rome) *et al.* in **Factor Five** (Earthscan, 2010). [NOTE: See the IEA’s **World Energy Outlook 2012**, the GFB Book of the Month for November 2012, which also stresses the benefits of energy efficiency.]

**Population.** Overpopulation and overconsumption are “the forgotten issue,” and both are central to resolving planetary environmental problems. Despite progress made in many countries, hundreds of millions of couples still lack access to contraception. Population should be part of climate policy, and could make a significant difference in world population by 2050, which could range between 8.1 and 10.6 billion according to UN projections.

**Arctic Alarm.** Developments in the Arctic region are a serious cause of concern at many levels. The feedback mechanisms that cause the Arctic to self-accelerate change are well-known. When ice melts, the albedo (degree of reflection) changes dramatically: from bouncing back about 85% of incoming radiation to surfaces that absorb 85%, which amplifies warming. “*This is probably the most important climate feedback on Earth.*” Due to the albedo feedback, it is possible that the entire Arctic will cross a tipping point, changing from a cold and ice-free state to an ice-free warm state. Indeed, there are signs that the Arctic may have entered a “death spiral.” Acidification is hitting the Arctic Ocean particularly hard, and permafrost is thawing faster than predicted, emitting large volumes of methane. “The canary in the coal mine is choking.” (p.118) [NOTE: See *GFB Update* newsletter for October 2012 on Greenland ice melt and sea level rise.]

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**The Economy: Getting it Right.** The world is in a triple crisis: the global financial crisis, the economic crisis of nations, and the crisis of the economy of nature. The conventional economic model, based on population/resource assumptions that go back to the early indus-

trial era, is out of date. Most economists still think that environmental impact in a country is reduced as the economy grows, and the influence of ecological and biophysical economists has been limited. Key changes that should be implemented: 1) stop using GDP growth as a development target and measure of well-being; 2) give a value to natural capital and ecosystem services; 3) rethink the discounting of future values (the discount rate should be low, near zero, or zero, in the context of climate policy strategies); 4) rethink the organization of the economy by moving toward circular material flows (radically increasing re-use and recycling). [NOTE: See *GFB Update* for September 2012 on the many new books on “New and Appropriate Economics.”]

**Financial Sector Reform.** Central banks generate only a small part of the money flow; most newly-created money results from debts issued by commercial banks. But conditions have changed, and a number of new credit instruments have been created that lead to increased risk-taking. Thus the collateral value held by many banks is far from stable. Values are inflated, and risks are building up as credit volume rapidly increases, along with higher prices and growing scarcity of some commodities. Financial markets have high exposure to investing in companies with a major stake in oil, gas, and coal, but the valuation of most of these fossil fuel companies rests on very shaky grounds. The financial sector can become a positive force for sustainability by: 1) a shadow price minimum for CO<sub>2</sub> applied to all loans or investments in fossil fuel businesses; 2) mandatory reporting by all major companies on how their activities affect important environment/resource issues; 3) ending the system of quarterly reporting that heightens short-term focus at the expense of long-term responsibility; 4) compensation systems that reward long-term value rather than short-term capital appreciation; 5) sustainability education for those working in banks and finance companies.

**A Circular Economy.** Resource efficiency alone won't be enough to get us where we need to be. When economies continue to grow, a large part of the gains will eventually be lost. A first step toward more efficient use of resources is to significantly increase recycling rates, which are “ridiculously low.” Citing *Towards a Circular Economy* (Ellen MacArthur Foundation, 2012) and *Cradle to Cradle* (Braungart and McDonough, 2002), the authors advocate that we seek “to extend wealth, minimize waste, and go for maximum reuse and recycling of materials.” These new business models to improve resource efficiency would lower CO<sub>2</sub> emissions. Policies to promote a circular economy include binding targets for resource efficiency, research priority to sustainable design, and raising taxes on use of virgin materials.

### 3. SIDEBAR CHAPTERS

Sidebar boxes in a book or article can enhance variety and bring in related topics. This book offers entire chapters that are related to the main argument, but, arguably, draw attention away from it:

- **Anders Wijkman on Politics.** As a former politician in Sweden and the European Parliament, Wijkman critiques the current political system as “poorly equipped” to deal with many of today’s complex problems, and “the media’s obsession with people rather than ideas.”
- **Johan Rockström on Science’s Role and Responsibility.** Notes over 500 international environmental agreements that “have so far failed in all but possibly one case” (the

Montreal Protocol on ozone), and that scientists are not exaggerating environmental risks but tending to tone them down. Calls for research “organized on a much broader understanding of systems.”

- **Climate Change Negotiations.** Describes the failed Copenhagen climate summit in 2009, the Cancun conference in 2010 (which, at least, rescued the negotiation process), and “a glimmer of hope” after the Durban conference in 2011—a step forward from “the point of view of the realist whose expectations were low.”
- **Attacks on Climate Science.** On the media’s “fatal misconception” that “both sides” in the climate debate involve two equal actors, the problems of climate change deniers (conspiracy theories, citing dubious experts, cherry picking isolated details, unreasonable demands for certitude), and types of deniers (constructive critics, underestimators, outright deniers).
- **Responses to Climate Deniers.** Deflates the most frequent arguments: that global warming doesn’t exist, the sun or natural variations have caused temperature increases, CO<sub>2</sub> emissions have no effect on climate or lower temperature, the reduction of Arctic summer sea ice has not occurred, and glaciers are not melting.
- **The Greenhouse Effect.** Describes the natural greenhouse effect that controls climate conditions, and the contribution of CO<sub>2</sub> at about 14%. “One thing is established beyond any doubt: CO<sub>2</sub> contributes substantially to the natural greenhouse effect.”
- **Sweden’s Climate Impact.** Is Sweden a world champion in climate policy? The official accounting based on domestic emissions captures only part of the picture, and fails to acknowledge embedded emissions in imported products such as autos, electronics, meat, and clothing. Thus Swedish carbon emissions as measured through consumption increased by 9% in the 2000-2008 period.
- **Growth’s Dilemma.** If GDP and purchasing power increase, so do demand and pressure on the environment. Moreover, efficiencies in energy and resource use increase growth (the rebound effect). The current growth model is not sustainable because: 1) it assumes that material wealth is an adequate measure of prosperity; 2) growth is unevenly distributed; 3) we have already gone into ecological overshoot. Some possible ways forward: mandatory targets for improving resource efficiency, lower taxes on labor while raising taxes on fossil fuels and crucial raw materials, smart market solutions for water shortages, incentives for companies to create long-lasting products that are easily upgraded and repaired, and climate and environment risks incorporated in banking operations.

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#### 4. COMMENT

The “bankrupting” of nature, or its mere degradation or transformation (so far, at least), is a very serious concern. The singular contribution here is that the authors rightly tie this to

climate change, as well as outmoded thinking about economics and finance. Whether people are consciously “denying” planetary boundaries (as stated in the book’s sub-title), or simply haven’t given it much thought until recently, is a moot point. The authors go to great lengths to refute climate change deniers, but don’t consider those who would dismiss the larger planetary boundaries concern, notably the generally implicit argument that new technologies can solve much or all of the problem, or that adequate restoration efforts and pollution control policies are well underway.

The critical argument that there are boundaries, even if not well-established in many cases, is important to make. Unfortunately, it is not pursued here in the detail that it deserves (e.g., nothing is said about desertification or aquifer depletion, two themes frequently pursued by Lester R. Brown, who is also ignored). Moreover, the presentation is confusing in parts, e.g. most of the nine biophysical processes (p45) that deserve consideration are not clearly explained (or discussion is scattered in the text), and the two charts on pp46-47 designate ten planetary boundaries.

This report breaks fresh ground while synthesizing many well-established ideas. But it is also unwieldy. The core message needs to be refined, and widely-distributed in various forms (articles, op-ed essays, documentary films, TV talk show appearances). Although the growth of global population and the pressure on resources and the biosphere are the central theme, the explosive parallel growth of the human “infosphere” in recent years is ignored, yet, arguably, this new buzzing world of hyper-abundant information and information technologies makes it far more difficult to convey the planetary boundaries message—which makes it all the more important to get the message right and pursue a multi-media outreach strategy to be heard above the din. A quick indicator that the Wijkman/Rockström report is unlikely to travel beyond a handful of already sympathetic scientists is the hefty \$45 asking price. Similarly, the new **Global Environment Outlook 5** report from the UN Environment Programme (Jan 2013, 548p) is priced at \$80. “**GEO-5**” reinforces the CoR report, warning that several critical thresholds have been exceeded or are close to tipping, and that, once passed, “abrupt and possibly irreversible changes to the life support functions of the planet are likely to occur.” But where are the idea champions, conveying this message of grave environmental alarm to the world? Pricey books, alone, won’t do the job.

Illustrative of the infosphere blindspot is the idealized advice by former politician Wijkman for political parties to revise their policies, in that “today’s political platforms lack sufficient relevance to the globalized world,” (p18) which is patently true. But politicians have a full plate of many other problems, most requiring immediate action, and also must first get elected. And thus it’s a matter of educating the electorate and educators to long-term systemic concerns—no small matter, indeed, in a world of megabucks political and corporate campaigns (witness the lack of success of Green parties outside of Germany—and even in Germany, where they are still a minority).

Facing up to the huge difficulties of selling—yes, *selling*—the planetary boundaries concept should lead to the strategy of broadening the coalition that is concerned with a sustainable world. By inviting more partners into serious collaboration (and acknowledging the best ideas, as well as similarities and unresolved differences), the voice for planetary boundaries can be amplified. (Consider the recent Egyptian election, where the forces for democracy and

a secular state were fragmented, resulting in victory for the Muslim Brotherhood—which was not at all intended by the Arab Spring uprising).

An example of a seemingly unlikely coalition partner is the *Re/Source 2050* report from the Smith School of Enterprise and the Environment at the University of Oxford (Jan 2013, 83p; [www.smithschool.ox.ac.uk](http://www.smithschool.ox.ac.uk)), which is nicely presented for the financial and investor communities in terms of two scenarios: “Growth” and “Health.” It discusses many of the concerns of the Club of Rome report (water, energy, climate change, land, infrastructure, business models, subsidies, economy), and also ends up advocating a “circular economy.” And, as much as the unwieldy and expensive CoR report—perhaps even more so—it could arguably be the leading edge in the global struggle for sustainability.

In addition to broadening the sustainability coalition to include the business and finance sector, efforts should be made to engage religious leaders who should be concerned about the ethics of desecrating God’s creation (as they occasionally are), and, especially, the security sector. For example, **Climate Change and National Security: A Country-Level Analysis** edited by Daniel Moran of the Naval Postgraduate School in Monterey CA (Georgetown University Press, 2011, 310p) provides a very detailed analysis of 19 countries and regions, where the outlook for food, water, environmental degradation, ruinous sea-level rise, and related conflicts is generally worrisome. Allies are needed in selling the notions of climate change and the expanded notion of planetary boundaries, and the well-funded security community could prove to be a major supporter of the many actions that will be needed for any semblance of a sustainable society.

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