

AUTUMN BOOKS



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ENVIRONMENTAL SCIENCES

Divided we save

An expanded model for heading off planetary tipping points offers much to both optimists and the apocalyptically inclined, finds **Peter Kareiva**.

Pessimism usually seems smarter than optimism. The pessimist is the ant in Aesop's fable: the realistic, sage, cautionary voice. The optimist is the grasshopper: the naive, un-analytical fool. Thomas Malthus was perhaps the most famous pessimistic intellectual, writing in his 1798 *An Essay on the Principle of Population*: "The power of population is so superior to the power of the earth to produce subsistence for man, that premature death must in some shape or other visit the human race."

The latest contribution to this grand

apocalyptic tradition is *Bankrupting Nature*. But, unlike previous pessimistic assessments of tipping points for humanity and Earth, this book by Johan Rockström, head of the Stockholm Resilience Centre, and Anders Wijkman, a former member of the European Parliament, combines a critique of political and economic systems with an assessment of global ecology. It is an extension of the influential planetary-boundaries idea that Rockström and colleagues first published in *Nature* in 2009.

Many scientists and scholars have issued

warnings about impending famine and environmental decimation, only to witness a relentless improvement in the human condition; but that is no reason to dismiss this book. First, the framing of limits in the past has primed important discussions and motivated change. Second, the ten planetary boundaries that Wijkman and Rockström have set out are not grounded in human thresholds, but are based on ecological, biogeochemical and atmospheric processes such as ocean acidification, biodiversity loss and freshwater use. Most importantly, no one can dispute that

human impacts on the planet are greater than ever — and still increasing, as the population grows and developing nations aspire to North American levels of consumption.

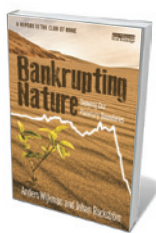
And the stakes are high. If one mistakenly warns of a doom that is not really around the corner, the cost might be slower economic growth. But if one fails to see the true apocalypse on the horizon, the consequences could be calamitous. For this reason, *Bankrupting Nature* deserves our attention.

The book's arguments are familiar, but rarely have they been gathered together in one place to clarify the links between politics, economics and ecology. Wijkman and Rockström lay out the dangers inherent in ignoring the planet's boundaries, and focus on renewable resources as an energy solution. They make a clarion call for transforming our economic system, replacing the outdated economic indicator of gross domestic product with broader human-welfare metrics such as Chilean economist Manfred Max-Neef's model and its incorporation of human needs, from freedom to creativity.

There are strengths and weaknesses in each of these discussions. Wind and solar power, the featured renewables, are really only an electricity solution. That leaves out many of our energy demands. And there is still a need to be as critical of problems with the transmission, storage and land footprints of renewable alternatives as we have learned to be with fossil fuels.

Regarding a new economics, the book spins several nice stories, but is light on analytical policy options. Take the authors' championing of a 'circular' economy, based on service, virtual assets and re-use as opposed to ever-expanding consumption of raw materials or a no-growth economy. What about the server farms that store and deliver all our information? These are energy hogs full of metals such as copper and silver, which must be extracted through often-damaging mining processes. Even recycling is not always environmentally benign.

Unlike many 'limits to growth' proclamations, however, Wijkman and Rockström's book makes the useful distinction between global and local perspectives. So although the nitrogen cycle is globally disrupted by excessive fertilization, additional fertilizer is still a good idea for depleted soils in Africa. Recovery, restoration and resilience might have been included, as in many cases, restoration remains possible even where boundaries have been locally



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exceeded and ecosystems have collapsed.

It has to be said that the boundary framing does not lend itself to policy actions. For example, we need, however roughly, to estimate the likelihood of people suffering severe impacts from climate disruption, and then to analyse the costs and benefits of different actions that could influence the carbon dioxide emissions trajectory. It is the relative effectiveness of natural gas at replacing coal that is the central question — not the planetary boundary for CO₂.

The authors sensibly sidestep the boundary model in discussing population growth, which they emphasize is the ultimate driver of many environmental problems. Instead, they focus on planetary opportunities: proven ways of reducing population, such as modest investments in family planning, economic opportunities for women and education of young girls. Similarly, in the developed world, we can modify consumption using modern marketing, education and pricing incentives. Approaching CO₂, acidification, nitrogen and the many other planetary boundaries in the same way would have been useful.

However the approaches are shaped, Wijkman and Rockström remind that action is imperative to stave off crisis. But a crisis of what magnitude? They warn of a coming apocalypse triggered by climate disruption and resource scarcity, drawing on Gwynne Dyer's book *Climate Wars* (Random House, 2008), with its scenarios of civil wars, conflicts between nations and collapsed governments. Earth does face severe environmental challenges, but these are a far cry from impending collapse. And although Rockström points to the risk of science being drawn into the political process, modern environmental science is all about examining trade-offs between choices in energy, resource use, infrastructure and waste disposal.

The ideas in this book are interesting and often inspiring, and, to some extent, the future of sustainability depends on wrestling them to the ground. In doing so, it is key to recognize that some scientists are optimists and others pessimists. To progress, this debate about limits and tipping points needs to be recast as a series of testable hypotheses about resource extraction, land and water use, and energy portfolios, addressable by models and data.

Some say that innovation, technology and new partnerships between business and conservation hold the answers to a bright future. Others argue that slower growth, happiness indicators and strong regulatory constraints are the only way to avert the apocalypse. It is premature to predict who will win the debate — the grasshopper or the ant. ■

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ENVIRONMENTAL
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