

## A Review of *The Upside of Down: Catastrophe, Creativity and the Renewal of Civilization* by Thomas Homer-Dixon

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### Introduction

In 1991 Professor Thomas Homer-Dixon of the University of Toronto published "On the Threshold: Environmental Changes as Causes of Acute Conflict" in the journal *International Security*. In that paper he argued that as environmental degradation increased societal disruption would increase along with it, while the capacity for coping with that disruption shrank. Accordingly, early intervention to halt that degradation had become a security issue.

Journalist Robert Kaplan compared this article favorably with George Kennan's Long Telegram, going so far as to say that just as America's Cold War policy of containing the Soviet Union had its beginnings in Kennan's writing, "our post-Cold War foreign policy will one day be seen to have had its beginnings" in "On The Threshold."<sup>[1]</sup>

While Kaplan helped popularize Homer-Dixon's ideas, they never received the same attention as Francis Fukuyama's or Thomas Friedman's, for instance. Additionally, while environmental security issues are now a regular feature of the dialogue among academics, the concept has enjoyed little recognition at the level of policy. Regrettably one can search in vain for anything more than cursory mention of the environment in current policy planning documents.

Since then Homer-Dixon has broadened the scope of his research. His 2000 book *The Ingenuity Gap: Facing the Economic, Environmental, and Other Challenges of an Increasingly Complex and Unpredictable Future* presents a look at those challenges through the lens of complexity theory, on which it is a handy primer.<sup>[2]</sup> In particular the author stressed the rising complexity of human-made social and technological systems, and the inherently difficult problems those systems raised. *The Ingenuity Gap* also questioned the conventional wisdom that science, democracy and markets would always deliver the ingenuity needed to solve those problems.

Homer-Dixon has since followed this up with *The Upside of Down: Catastrophe, Creativity And The Renewal Of Civilization*. Where in the previous book he presented an introductory look at the problem, here he offers a "big picture" view of modernity under threat from multiple directions, ranging from global warming to nuclear terrorism. In doing so the author draws heavily on many

disciplines, and in particular the work of two renowned complexity theorists, Joseph Tainter and C.S. Holling.[3]

In synthesizing their work *The Upside of Down* presents a model that can be crudely described as follows. Systems, such as social systems, routinely respond to problems by becoming more connected, specialized, regulated and efficient—in other words, with a more complex organization of their resources. For instance, an agrarian society facing declining rainfall may respond by building an irrigation system to keep its crops watered.

However, complexity is a movement away from thermodynamic equilibrium. It requires inputs of energy to sustain it (or in thermodynamic terms, keep entropy at bay). More complexity means more energy is needed for maintenance, just as the irrigation system requires constant maintenance to keep it functional. This is not a problem in itself, but investments in complexity can pass a point of diminishing marginal returns, as could happen when that irrigation system is expanded to less fertile farmland, so that the same investment of labor produces smaller increases in food production.

These diminishing returns (which might eventually become negative returns) eat into a system's "slack," the unused buffering capacity that lets it absorb unexpected shocks, such as surplus food production which would help the society respond to a barbarian attack or a natural disaster. As a result a shock like this is increasingly likely to induce a system-wide collapse. Awful as this outcome may be, though, collapse is not necessarily the end of that system. The reduction of its connectivity, specialization and regulation by that collapse also mean that the resources that were so rigidly organized before (such as the labor and wealth once absorbed by the now-defunct irrigation system) are released for reorganization.

Homer-Dixon terms this cyclical renewal through breakdown "catagenesis," and in his analysis our civilization is in a late phase of this cycle. It is increasingly efficient, connected and complex, but also increasingly brittle, and in jeopardy of running out of the energy needed to sustain itself. To make the case that modern societies are at this point the author uses the concept of EROI (Energy Return On Investment), and the diminishing returns to oil production as supplies become scarcer and more expensive to recover.[4]

This is precisely the moment at which an unexpected shock is most likely to cause a system-wide breakdown, and the book identifies five major stresses of particular concern: population stress, due to high growth rates in poor societies and the expansion of their megacities; energy stress, especially a scarcity of conventional oil; environmental stress, from damage to land, water, forests and fisheries; climate stress; and economic stress due to financial instability and widening inequality.

Each of these problems rates a full chapter in this book. The connections between problems are also given their due, such as the implications of climate change for resource use, and the ways population pressure and widening inequality can produce negative synergies. The book also demonstrates the connections between these issues and more commonly discussed problems like terrorism, weapons of mass destruction and state failure, providing a useful reminder of how ecological, economic and resource concerns usually underlie those issues.

On the whole the book's mastery of this very diverse material is formidable, and the presentation highly readable. Additionally, while some reviewers have faulted it for being short on solutions, the book in fact does rather well on that point. All too often the solutions offered at the end of even a very solid analysis turn out to be underdeveloped or simplistic, frequently because they dare not offend the pieties of the moment.

This can not be said of *The Upside of Down*. Homer-Dixon does not downplay his position that a passive or managerial approach to these problems is wholly inadequate. Additionally, while technology will be key he notes that "at root, our global problems are not really technical ones: they're political problems fraught with conflicts over values, interests, and power; surrounded by scientific uncertainty; and burdened with deep moral implications."

Nor does the author say that dealing with those political problems will be easy and painless. He argues that within the framework of a fossil-fuel based, *laissez-faire* global economy committed to a "growth imperative" of limitless expansion, the prospects for a fundamental solution are slim. Modern civilization may have to change significantly to survive, starting with its basic economic assumptions, like the desirability of continuous economic growth; the decoupling of economies from nature; the ability of markets to solve problems unaided; and the belief that connectivity is always an unalloyed good. Vested interests will not only obstruct necessary reforms, but often be so successful in doing so that it will take quite a nasty shock to make really serious action on many problems politically realistic. He is not afraid to mention possibilities like a decentralized and/or steady-state economy, international regulatory agencies to control carbon emissions or even world government.

However, there is no convenient checklist of solutions at the end. Rather the book offers a path to a solution, beginning with the search for a middle ground between the brittleness he sees now and catastrophic, deep collapse. Some kind of breakdown may be unavoidable, but everything that can be done to blunt it, should be.

One way is by reducing the force of the stresses he discusses. There is no "silver bullet" for them, but there are already numerous thinkers working on these problems, and there are clear ways to mitigate them (such as supporting family planning in the developing world). What is needed is for the experts to come together across disciplinary barriers, just as governments must come together from across their political ones, and act proactively on all of these fronts at once.

At the same time systems currently oriented toward connectivity, efficiency and productivity will have to be made more resilient, even if it means less connectivity, efficiency and productivity. For instance, decentralized solar power production would be well worth pursuing, even if it is less efficient than the output from big fossil fuel and nuclear plants, because it would reduce the vulnerability to distant disruptions. If (or more likely, when) the breakdown comes, not only will this help minimize the damage, but it will hopefully allow room for a reorganization of modern systems along sounder lines.

Of course, a happy outcome is not guaranteed. Extremists could easily take advantage of the disruption and worsen matters. Effective, positive action will depend on two factors. The first is the widespread cultivation of a mind-set that the book terms "prospective," able to cope with uncertainty and complexity, and neither naively optimistic nor apathetically pessimistic. The second is advance planning, the development of some vision of where to go afterward. This will mean active, meaningful debate; the development of a sense of global solidarity; and widespread experimentation with alternative arrangements.

The book therefore succeeds on this level too, though one point might have been better developed, specifically the examination of catagenesis. Homer-Dixon's discussion of Rome's fall is lucid and thorough, but the story ends with that empire's deep collapse. There is no comparable discussion of catagenesis at a civilizational level—and indeed, there are better and nearer cases. Several scholars, including Carroll Quigley in *The Evolution of Civilizations* and David Hackett Fischer in *The Great Wave*, have discerned a pattern of previous breakdowns and renewals in Western history, driven by many of the same stresses (population growth, economic instability, abrupt climate change, etc.). The most dramatic was arguably the collapse of Medieval civilization amid famine, plague and war in the fourteenth century, and the rise of modernity out of the ruins. Particularly given Homer-Dixon's assertion that the anticipated breakdown will likely

happen much more quickly than Rome's protracted decline, this crisis (or another like it) may have been usefully explored.

This is a minor weakness, however. On the whole *The Upside of Down* is a valuable contribution to the literature for its sobering assessment of the difficulties of many of today's problems, the still underexamined connections between the environment and security studies, and the applicability of complexity science to these issues. Knee-jerk reactions to some of its arguments will turn off some readers, but they would be well-advised to press ahead despite that. *The Upside of Down* deserves as wide an audience as it can get, and it will hopefully provoke a more substantial debate on the issues it raises than has been seen so far.

## About the Reviewer

Nader Elhefnawy has published widely on international security issues in forums including *Parameters*, *Astropolitics* and *International Security*. He has a B.A. in International Relations from Florida International University and a Ph.D. in Literature from the University of Miami, where he currently lectures.

## Book Information

Thomas Homer-Dixon, *The Upside of Down: Catastrophe, Creativity and the Renewal of Civilization* (Washington, DC: Island Press, 2006). ISBN: 1-59726-064-9. \$25.95.

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## References

1. Robert Kaplan discussed Homer-Dixon's ideas in "[The Coming Anarchy](#)," *The Atlantic Monthly*, February 1994, 44-76.
2. For a first book on complexity theory, Nicholas Rescher's *Complexity: A Philosophical Overview* (New Brunswick, NJ: Transaction Publishers, 1998) is probably the best choice.
3. Tainter's most important work is *The Collapse of Complex Societies* (New York: Cambridge University Press, 1988). For an explanation of Holling's thinking on this matter, see "[Understanding the Complexity of Economic, Ecological and Social Systems](#)," *Ecosystems* 4.1 (2001), 390-405.
4. Nader Elhefnawy's "Societal Complexity and Diminishing Returns in Security," an earlier attempt to apply Tainter's ideas to security which appeared in the Summer 2004 issue of *International Security*, takes a somewhat broader approach. In addressing the same question it examines government fiscal balances, returns in economic sectors besides energy and aggregate economic growth. However, it comes to a similar conclusion.

