

Evaluating “Overshoot and Collapse” Futures

By Richard A. Slaughter

Introduction

You don't have to be a professional futurist or foresight practitioner to realise that premonitions of disaster have a long history. Moreover, we have recent experience of the Global Financial Crisis (GFC) and its continuing aftermath to remind us that the world is currently nowhere near what might be called an “equilibrium state.”

Yet standing behind current concerns that fill the headlines daily (economic woes, political dilemmas, armed conflicts, and the struggle to seriously address global warming) there's another deeper, larger, and more systemic danger that we overlook at our peril. It has to do with the way that humanity's collective impacts have already exceeded global limits in some key areas and look set to exceed others later in this century.

The puzzling thing is, however, that this is not news. The dangers of the growth trajectory have been understood and spelled out with increasing clarity and rigor for several decades. Unfortunately these signals of change have been widely ignored in favor of business-as-usual and the continued pursuit of growth at any cost. So long as economic growth continued there was sufficient wealth, in principle, to keep the rich happy and to keep everyone else diverted from the task

of thoroughgoing renewal.

But the game of pacifying the poor no longer works. It has failed in the technically advanced nations and it has failed in the least advanced, as well. So, overall, we are confronting an upheaval in human affairs beyond anything ever seen before, anywhere.

The term “overshoot and collapse” emerged from the language of systems analysis and may be unfamiliar to many people. Yet the perspective it represents offers new clarity about the role of humankind in its world. This paper takes a close look at one of the most significant pieces of work ever carried out on global issues: the Limits to Growth (LtG) study and its evolution over more than three decades. Of equal significance are later studies that evaluated LtG's relevance to the early twenty-first-century world and introduced new evidence about global change.

After reviewing these, I briefly consider two other approaches. One offers a “Gaian” perspective on the human predicament. The other is a comparative study that considers how previous societies exceeded their own limits and offers some suggestions for ours. Both add value to the debate, but certain important caveats will also be noted. Overall, the intention is to answer two questions:

Richard A. Slaughter is an internationally recognized writer, practitioner, and innovator in Futures Studies / Applied Foresight and currently director of Foresight International, Brisbane. He is the author or editor of some 20 books and many papers on a variety of futures topics. He was recently voted one of the “all-time best futurists” by the Foresight Network, *Shaping Tomorrow*. His most recent work is *The Biggest Wake Up Call in History*, which may be obtained via: <http://www.foresightinternational.com.au>. His weblog contains image galleries, reviews, recent work, and commentaries on futures-related subjects: <http://www.richardslaughter.com.au/>.

Editor's Note: This paper has been adapted by the author from Chapter 3 of his book *The Biggest Wake Up Call in History* (Brisbane: Foresight International, 2010).

Is “overshoot and collapse” a credible notion based on firm evidence? And if so, what does this imply? If we can gain some real clarity here we will at least have made a start on the unprecedented tasks facing us. The sooner we begin, the greater our chances of success, and vice versa.

A Very Particular Danger

In many—perhaps most—situations it can appear reasonable to adopt a “wait and see” attitude. If the problem worsens, there is usually time to respond and correct it. But some situations are “time critical,” meaning that to wait is to court disaster. Examples are legion, but we still have great difficulty knowing when to act and when to wait due to natural reticence, the complexity of ill-defined situations, and opportunity costs.

In early 2009 many people lost their lives in bushfires near Melbourne because the conflagration occurred so quickly they were unable to escape. Such disasters have happened before and will, no doubt, happen again. Now, however, we face not simply one particular threat but a number of threats coming together at roughly the same time. Moreover, this is occurring not merely on a local or even on a regional scale but globally.

This means that the encroaching challenge to civilization cannot be adequately resolved by any single country or jurisdiction. Also, to give the screw one final turn, this challenge is not one that stands before everyone, everywhere, as a clear and present danger that calls forth immediate and effective social responses. Rather, it is challenging different people in different ways.

This very particular danger is only visible within prepared and open human minds. It takes on greater reality for those who feel the experience of change most acutely—generally, that is, by minorities or those (still often perceived as “outsiders”) willing to pursue the kind of careful study and extended reflection that, almost by definition, will be undertaken only by a few.

Currently there is no effective institutional

capacity for social foresight anywhere. Thus, under present conditions, only a relatively small minority of people sees the danger clearly and is motivated to start working on solutions. And those who attempt to implement solutions confront a social and economic system that wants no new ideas except those that seem to produce immediate benefits in terms of power and profit.

Viewed from a broader perspective, this attitude is contradictory and a certain recipe for disaster. How, therefore, can the threats to humanity be made so clear and credible that whole societies can begin to consciously respond to them?

It is not enough to call, as some do, for the sort of responses that are elicited by war and the threat of war. The threats to survival in rich developed countries are not yet of that kind. Unlike those living on the edge in various parts of the Third World, still-affluent populations do not yet see disaster dead ahead with the kind of immediacy that accompanies famine and war. Nor does humanity quite yet stand on the brink of utter extinction with the threat that all that we hold dear will be torn apart before our eyes (though, in truth we are closer to this than most realize).

For those sufficiently affluent to remain largely insulated from natural processes, the threats remain too subtle, distant, and complex to make them willing to rethink assumptions and work together in ways that matter. Clearly, we need new rationales for action backed by meaningful evidence and compelling options. The central purpose of this paper, and the new book it was adapted from, is to provide part of the groundwork needed in order to achieve this.¹

The Limits to Growth Project

The 1972 publication of *The Limits to Growth* created a debate that has ebbed and flowed ever since.² The book looked in some detail at the phenomenon of exponential growth and argued that its dangers had been widely overlooked. It provided a number of examples to suggest that, given

such growth, it is possible to move very quickly from a situation of abundance to one of scarcity. This leads to a crucial insight that is constantly overlooked by climate-change deniers and others—i.e., that “precise numerical assumptions about the limits of the earth are unimportant when viewed against the inexorable progress of exponential growth.”³

It follows that a combination of population growth, agricultural production, resource depletion, industrial output, and pollution would lead to the collapse of civilization unless limits to growth were observed before they became compelling. These conclusions were based on computer modeling techniques that were not widely known or understood at the time. On the one hand, these appeared to give the thesis a certain credibility; but on the other, various specialists questioned some of the underlying assumptions and methodologies employed.⁴

The Club of Rome, which had sponsored the report, also provided sufficient publicity to keep it in the public eye for some time where it attracted much interest and comment. But the central message of the book was uncompromising. It is worth setting it out in full here:

There may be much disagreement with the statement that population and capital growth must stop soon. But virtually no one will argue that material growth on this planet can go on forever. At this point in man’s history, the choice posed above is still available in almost every sphere of human activity. Man can still choose his limits and stop when he pleases by weakening some of the strong pressures that cause capital and population growth, or by instituting counterpressures, or both.

Such counterpressures will probably not be entirely pleasant. They will certainly involve profound changes in the so-

cial and economic structures that have been deeply impressed into human culture by centuries of growth. The alternative is to wait until the price of technology becomes more than society can pay, or until the side effects of technology suppress growth themselves, or until problems arise that have no technical solutions. At any of those points the choice of limits will be gone. Growth will be stopped by pressures that are not of human choosing and that, as the model suggests, may be very much worse than those which society might choose for itself.⁵

The authors of LtG also argued that placing our faith in technology as the “ultimate solution” diverts our attention from what they called the “ultimate problem”: how to deal with growth within a finite system. In setting out this thesis so clearly and directly, the LtG study, in effect, fired a couple of shots across the bow of the great ship “Progress” that had been steaming steadily ahead for several centuries. But, far from considering the thesis on its merits what actually happened was that, after an initial burst of publicity and comment, the study was effectively ignored.

This occurred for a couple of reasons. First, the growth imperative is the powering dynamic of capitalist system. With growth, so it is claimed, the “cake” just keeps getting bigger so that, in theory, everyone can have more. Given that the purported “overshoot” was way off in the haze of the future, there was simply no countervailing force at hand to rein in a process from which so many people had benefited. Second, in posing the issue this way—through computer modeling, graphs, diagrams, and so on—the study’s authors were initially unable to connect with, or even recognize, the full personal, social, and cultural implications of their proposals for controlling growth and avoiding disaster.

These implications were barely glimpsed

from within the study and certainly not named or engaged in any meaningful way. Nevertheless, it is wrong to think of this work as a failure. It succeeded in raising issues and articulating concerns about the viability of a growth-oriented and technology-focused culture that needed to be in the public domain.

Another stage in the LtG project was marked with a 1992 work called *Beyond the Limits*.⁶ It presented an updated and clearer account of exponential growth, backed by improved modeling techniques. It also reviewed the nature of limits and reconsidered the dynamics of growth in a finite world. One of the new features of the work was the way that it demonstrated beyond all doubt that foresight had become a structural necessity. In a section called “Why overshoot and collapse?” the authors wrote that:

Overshoot comes from delays in feedback—from the fact that decision makers in the system do not get, or believe, or act upon information that limits have been exceeded until long after they have been exceeded.... The larger the accumulated stocks, the higher and longer the overshoot can be. If a society takes its signals from the simple availability of stocks, rather than from their size, quality, diversity, health and rates of replenishment, it will overshoot.⁷

There then follows a statement that illuminates the situation we have now reached:

Physical momentum causes delay not in the warning signals, but in the response to the signals. Because of the time it takes forests to grow, populations to age, pollutants to work their way through the ecosystem, polluted waters to clear, capital plants to depreciate, and people to be educated or retrained, the eco-

nomie system can't change overnight, even if it gets and acknowledges clear and timely signals that it should do so. *To steer correctly, a system with inherent physical momentum needs to be looking decades ahead.*⁸ (Emphasis added.)

I know of no clearer explanation as to why what I call “social foresight” has become a structural necessity. Without it, or something very similar, crucial signals from the environment are not received, not understood nor interpreted correctly, and certainly not fed into critical decision-making processes across the board. Such oversights have already become prohibitively expensive not merely to people and the human economy, but also within the progressively degraded global commons upon which all life depends.

Later in *Beyond the Limits* the authors explain why “timely action” is so central to their thesis. Growth can be insidious because it may shorten the time available for key decisions to be made. Systems that had coped during slower periods of change may be close to reaching their limits and in danger of collapse before awareness of the fact has been achieved. Technology and markets that worked well during slower periods of change could be overwhelmed as a society rapidly reaches interconnected limits.

One reason for this is the cost of adjustment mechanisms, such as new tax regimes or more energy-efficient technologies. Another is that distortions and delays occur in feedback (information) loops. For example, scientists may fail to be heard and national councils may be politically neutralized, undermined, or unresponsive. Finally, and crucially, they note that:

The market and technology are merely tools that serve the goals, the ethics, and the time perspectives of the society as a whole. If the goals are growth-oriented, the ethics are unjust,

and the time horizons are short, technology and markets can hasten a collapse instead of preventing it.⁹

The recognition that intangibles such as goals, ethics, and time perspectives play a key role was of primary significance. In this and other ways *Beyond the Limits* offered a new understanding informed by over 20 years' further work and reflection. Apart from describing the dynamics of exponential growth more clearly, and providing up-to-date examples, the analysis was beginning to zero in, as it were, on the human and social sources of the issues raised. Indeed, near the end of the book the authors concluded that "It is necessary for the present generation not only to bring itself below the earth's limits but to restructure its inner and outer worlds."¹⁰

This is a crucial insight, which alerts us to the fact that for such ideas to take root and emerge in practice requires a readiness and a capacity that may be in shorter supply than we might wish. In turn, what this indicates is the adequacy or otherwise of the interior resources available within people and cultures. *Beyond the Limits* concluded by outlining a number of shifts that the authors considered were necessary in culture, human behavior, and governance. Briefly, these included visioning, truth telling, and loving—qualities that thus far have not figured largely in public or international affairs anywhere in the world.¹¹

What is currently the final book in the series was published in 2005. It was appropriately called *Limits to Growth: the 30 Year Update*.¹² The book presents what the authors refer to as "pervasive and convincing evidence that the global society is now above its carrying capacity." They acknowledge that:

The idea that there might be limits to growth is for many people impossible to imagine. Limits are politically unmentionable and economically unthinkable.

The culture tends to deny the possibility of limits by placing a profound faith in the powers of technology, the workings of a free market, and the growth of the economy as the solution to all problems, even the problems caused by growth.¹³

Part of the book is devoted to reviewing criticisms of the earlier works, considering changes in the World3 model, testing assumptions and showing very clearly why they believe humanity is already living in "overshoot" mode. Though dealing with some very difficult issues, it avoids being either shrill or defensive. The authors are clear about their values and open about their methodology. They seek to offer new possibilities for understanding and dealing with the global predicament. In particular they suggest a number of ways to avoid overshoot and collapse of natural systems. These include:

- Growth in population and capital must be slowed and eventually stopped by human decisions enacted in anticipation of future problems rather than by feedback from external limits that have been exceeded.
- Throughputs of energy and materials must be reduced by drastically increasing the efficiency of capital (de-materialization, lifestyle changes, etc.).
- Sources and sinks must be conserved and, where possible, restored.
- Signals must be improved and reactions speeded up; society must look further ahead and base actions on long-term costs and benefits.
- Erosion must be prevented and, where it already exists, slowed and then reversed.¹⁴

Clearly these suggestions build on the earlier work and are stated with as much—if not greater—clarity and force. Yet a crucial continuity from previous decades still applies. Even these most recent proposals appear an all-but-impossible program for growth and market-oriented societies as they are presently constituted. Even at this late

stage there is not sufficiently broad understanding within society as a whole and, as a result, there is still little or no political will to ensure that recommended actions will be taken seriously, let alone carried out in practice.

By our failure to respond adequately to this diagnosis, the crisis has not been resolved; it has merely been deferred. We can be quite certain about this because it has re-emerged in a yet more extreme and intractable form in the guise of global warming. Recognizing this, the authors of *LtG 30 Year Update* also offer what they call “transitions” to a more sustainable system. They note that there are three ways that the human world can respond to signals that environmental limits are being exceeded. These are:

- Deny, disguise, or confuse the signals.
- Respond by alleviating the pressures through technological fixes.
- Work on underlying causes and change the structure of the system.¹⁵

At present there can be little doubt that the dominant response is the first, followed by the second. There is little or no prospect of even approaching the third response at the present time as “changing the structure of the system” poses almost insuperable problems and also assumes levels of clarity and understanding that almost certainly exceed our individual and collective grasp.

The conclusion seems to be that experience will continue to be a more effective teacher than foresight. Yet we should pause before assuming the worst. For one thing, new insights are constantly arising. For another, this is far from a simple “gloom and doom” story that often provides a spurious excuse for doing nothing.

Reviewing and Evaluating Limits to Growth

One of the co-authors of the “Limits” series, Jorgen Randers, took a fresh look at the whole issue in a 2008 paper called “Global Collapse, Fact

or Fiction?”¹⁶ He reminded readers that the main point of the LtG research was not to stop growth but, rather, to provide a basis for understanding the dynamics of overshoot and collapse. Specifically, “Limits warned about overshoot, followed by collapse, as a potential threat in the first part of the 21st century. [These] ... would result if humanity continued to disregard planetary limitations on resource availability or global environmental constraints.”¹⁷

The former “occurs when the ‘ecological footprint of humanity’ (which equals the sum total of mankind’s resource use and pollution generation) grows beyond the carrying capacity of the planet (which equals the total capability of the globe to sustain human life).” Then “collapse is a sudden, unwanted, and unstoppable decline in the average welfare of a number of global citizens.”

He further defines such a collapse as “global” if it “affects at least 1 billion people, who lose at least 50% of something they hold dear, within a period of 20 years.”¹⁸ This is obviously a measure that can be critiqued on a number of grounds, not least that it vastly understates the magnitude of likely future events of this kind.

He then gives four of many possible “local” examples of this dynamic that have already occurred: the over-harvesting of wood on Easter Island that led to the collapse of that society; the over-fishing of Canadian cod, which destroyed the stock and forced the disbanding of the fleet; the over-valuation of share prices leading to boom and bust cycles; and, finally, the global financial crisis of 2008–2009. In the light of these examples he suggests that the overshoot and collapse syndrome is based on two major factors. These are, first, the way that the supposedly well-informed can deny what is happening right up to the point where it occurs and second, the continuation of growth beyond sustainable levels. This, in his view, is “the root cause” of the problem.

Such “local” phenomena can also be seen in more global terms by looking more closely at hu-

He says furthermore that “The good comparison of scenario outputs with historical data provides a degree of validation of the World3 model, and emphasises the likelihood of the global system reproducing the underlying dynamics of the ‘standard run’ scenario.”²³ Some of the details of the latter also closely matched other emerging issues, such as those of peak oil and constraints on food production in some areas. But the sting, as it were, is in the tail for Turner. He concludes:

[T]he observed historical data for 1970–2000 most closely matches the simulated results of the LtG “standard run” scenario for almost all the outputs reported; this scenario results in global collapse before the middle of this century.²⁴

The data comparison presented here lends support to the conclusion from the LtG that the global system is on an unsustainable trajectory unless there is a substantial and rapid reduction in consumptive behavior, in combination with technical progress.²⁵

These are powerful and challenging conclusions but the truly remarkable thing is that even at this late date they are still not widely understood or taken seriously. That said, there is evidence that scholars and other commentators are beginning reinterpret the meaning and implications of the LtG debate.²⁶

Then, in 2009, Johan Rockstrom, director of the Stockholm Environment Institute, Sweden, convened a meeting of specialists to take a fresh look at human impacts on the global system.²⁷ This time the focus was on nine interlinked planetary boundaries and the thresholds associated with each. Figure 1 shows the main results.

The research team found that planetary boundaries had already been exceeded in three cases (climate change, species extinctions, and the nitrogen cycle), that four more were close to be-

ing breached (ozone depletion, fresh water usage, ocean acidification, and changes in land use), but that there was insufficient data to decide on the remaining two (atmospheric aerosol loading and chemical pollution). In the present context these are fairly dramatic results and again they should have set the alarm bells ringing.

Yet the article ends by stressing the “gaps in our knowledge” and, somewhat perversely stating “the evidence so far suggests that, as long as the thresholds are not crossed, humanity has the freedom to pursue long-term social and economic development.”²⁸ I would have thought that was exactly what is at risk now.

A later article in *New Scientist* reviewed the results of the study and concluded that, “however you cut it, our life support systems are not in good shape.”²⁹ Yet this piece also concluded with the good news that the ozone hole in the atmosphere was “gradually healing,” suggesting that “action is possible—and can be successful.”³⁰ In both cases a dire situation was played down in favor of what looks like a kind of false optimism. So, while it makes sense to avoid overstatement, it also seems that parts of the scientific community prefer to sugar the pill, rather than come out and clearly state that humanity is currently set on a no-win path. Others, however, are more forthcoming.

Notions of “Collapse”

As I indicated above, there is much more to the notion of “collapse” than first appears. So it is useful here to consider two rather different accounts. James Lovelock is well known as the originator of the Gaia hypothesis, the notion that the Earth is a self-balancing system in which all the elements of nature work together to maintain global equilibrium. To some it is a metaphor and to others a useful way of thinking about an integrated planetary system. In a number of publications, Lovelock has drawn on recent science to propose that humanity is faced with its greatest challenge ever—to restore the balance between it and the

Earth or be mercilessly pushed to the margins.

In his view global warming (which he calls “global heating”) from rising levels of CO₂ and other greenhouse gases in the atmosphere will raise global temperatures by as much as 6°C to 8°C and, in the process, trigger abrupt and irreversible climate shifts. Among them are the melting of the polar ice caps, the “switching off” of the Gulf Stream (or “ocean conveyor”) that warms western Europe, abrupt shifts in rainfall patterns, and the rendering of large tracts of land unproductive and uninhabitable. Sea levels will rise, submerging coastal cities and displacing large numbers of people. Overall, he anticipates “a climate storm the Earth has not seen for 55 million years.”³¹

In this catastrophist view, the human species has become complacent about its place upon the earth and takes seriously neither its current impacts nor where these will lead. As Lovelock notes, “our journey into the future is amazingly unprepared.”³² Enough is known about the global system, and about how it functions, to provide us with clear warnings of what lies ahead and perhaps even time to deal with it. But business-as-usual thinking no longer makes any sense and is seen as evidence of the inertia of the industrial outlook. If it remains in place then “our species may never again enjoy the lush and verdant world we had only a hundred years ago.... Few of the teeming billions now living will survive.”³³

The author adds several new ideas to the developing debate. First, he asks us to set aside notions of “sustainable development” and so-called “renewable” energy sources. In his view both are little more than romantic dreams. In one of the most outspoken passages he writes that:

Our religions have not yet given us the rules and the guidance for our relationship with Gaia. The humanist concept of sustainable development and the Christian concept of stewardship are

flawed by unconscious hubris. We have neither the knowledge nor the capacity to achieve them. We are no more qualified to be the stewards or developers of the Earth than are goats to be gardeners.³⁴

Second, he argues forcefully for a reconsideration of the possible role of nuclear energy which, in his view, has been too-readily demonized and dismissed but is the only source of energy that, in the absence of fusion power, will be able to provide base-load electricity for the foreseeable future. In this respect he parts company from other observers who broadly identify with the environmental movement but view nuclear power as an expensive diversion.

Third, he proposes a value change that goes to the heart of the relationship between the species and the planet. He asks us to think of Gaia first and to place humanity second. That is, to reverse the deeply inscribed habits, ways of thinking, operating procedures and the like which have guided human behaviour over millennia. In part this echoes the view from the LtG study which suggests that “We have to make our own constraints on growth and we have to do it now.”³⁵ Yet since the prospects for achieving such constraints in the next decade or soon thereafter remain remote, what should we do? A small ray of hope is offered in the following statement:

We need the people of the world to sense the real and present danger so that they will spontaneously mobilize and unstintingly bring about an orderly and sustainable withdrawal to a world where we try to live in harmony with Gaia.³⁶

There are a number of criticisms of the Gaia hypothesis, one of which is the way it employs the metaphor of a “benign Earth Goddess” to represent concepts from science in general and from systems science in particular. Another is that Gaia

herself may not actually be that benign. In fact recent evidence suggests otherwise. For example, Peter Ward writes:

Two lines of research are particularly damning: One comes from deep time—the study of ancient rocks—and the other from models of the future. Both overturn key Gaian predictions and suggest that life on Earth has repeatedly endured “Medean” events—drastic drops in biodiversity and abundance driven by life itself—and will do so again in the future.³⁷

Many, if not most, mass extinctions in the past had “microbial” sources. That is, such extinctions appear to have been caused by “huge blooms of bacteria belching poisonous hydrogen sulphide gas.” In this view, Gaia is an illusion and “life seems to be pursuing its own demise.”³⁸

Many responses to such downbeat views are, of course, possible. On the one hand they could reinforce an existentialist viewpoint that life was always pretty meaningless anyway. On the other, one might also conclude that, if life is so transient, rising and falling over time, then it should also be considered precious and therefore particularly worthy of our care and respect.

This reveals a vital clue. The future of the world depends not only on the clarity of the diagnoses provided by science. More profoundly it depends on the individual and collective responses of human beings that emerge from their values, perceptions, and worldviews. The perception that the human race itself may be shutting down the wellsprings of life on the planet, destroying its life-support systems and interfering in the great cycles of matter and energy, projects the species into new territory where more empowering responses can also be envisaged.

If, instead of labeling potentially disastrous futures as mere “gloom and doom,” we openly ac-

knowledged the reality of what collectively stands before us—an uninhabitable world and the decline of the human species—what then? We might discover sources of insight, strength, and motivation that would finally enable us to make some of these deep-seated and systemic changes in self-concept and in how we live and relate to the rest of the world.

As we have seen above, most of the evidence for the “overshoot and collapse” hypothesis comes from using the past to model various possible futures. Complementing this approach is another sub-field of enquiry that looks at how a number of past societies have dealt with these same issues. One of the most influential is Joseph Tainter’s work on social collapse.³⁹ A further addition to this literature is Jared Diamond’s work *Collapse*, which provides further insights into the factors and dynamics involved.⁴⁰

While Diamond’s earlier work used comparative studies of past societies to understand how each was built up and established, *Collapse* focuses on how they either survived or broke down. Eight factors are held to have been responsible for past breakdowns: deforestation and other habitat destruction; soil erosion, salinization, and loss of fertility; problems with water management, overhunting, overfishing, and the effects of introduced species; and finally, contributing to all of these, overpopulation. Four factors are cited that affect our own prospects. These are anthropogenic (human caused) climate change, toxins in our environment, energy shortages, and, again, population growth.

The bulk of Diamond’s book provides a valuable compendium of case studies showing how these factors operated at different times and in different places. His hope is that if we understand the past, we may be clearer about the causes of collapse and act more decisively to prevent it. Thus the last three chapters are devoted to the “practical lessons” that have emerged. He asks “Why do some societies make disastrous choices?”

How does big business relate to the environment? And finally, what does it all mean for us today?" Among the reasons he cites for societal bad choices are:

- Failure to anticipate a problem before it arrives.
- Failure to recognise a problem after it has arrived.
- Failure to solve a problem after it has arrived and been recognised.⁴¹

Reasons for these failures have multiple and very familiar explanations including: perverse subsidies, inappropriate responses to the "tragedy of the commons" (i.e., over-exploitation of commonly owned resources), and the overextension of values or, conversely, blind adherence to currently disastrous ones. In addition, various psychological factors are mentioned, including crowd psychology and the varieties of human denial.

Some cogent observations are made here but he passes rather lightly over this territory. For example, Diamond treats big business with remarkable restraint. He notes what he considers to be positive examples of constructive, long-term thinking even in areas such as agriculture and ocean fisheries where, as we have seen, unsustainable practices are common. And he holds the public responsible for actively or passively acceding to unsustainable business practices.

In his final chapter, however, Diamond puts aside any residual doubt about where he stands. It summarizes a dozen familiar concerns, such as the loss of natural habitats and the steady decline in genetic diversity, various environmental insults, water and energy shortages, chemical pollution, climate change, and continued growth in the human population. He concludes, as others have, that:

Our world society is presently on a non-sustainable course, and any of our 12 problems of non-sustainability that we have just summarized would suffice

to limit our lifestyle within the next several decades. They are like time bombs with fuses of less than 50 years.⁴²

This conclusion is strikingly similar to Turner's, above. In Diamond's view, the major oversight for which we are all responsible is that "the prosperity that the First World enjoys at present is based on spending down the environmental capital in the bank."⁴³ Thus there is no longer any room for debate about whether past collapses have modern parallels and associated lessons. Rather, "such collapses have actually been happening recently, and others appear to be imminent. Instead, the real question is how many more countries will undergo them."⁴⁴ Given all this work, and especially the in-depth examination of a dozen or so case studies, the grounds for hope that Diamond offers seem rather slender. Here is a summary:

- Because we are the cause of our environmental problems, we are the ones in control of them, and we can choose to stop causing them and start solving them.
- We can muster the courage to practice long-term thinking, and to make bold, courageous, anticipatory decisions at a time when problems have become perceptible but before they have reached crisis proportions.
- But we must also find the courage to make many painful decisions about value; e.g., how much of our traditional consumer culture and First World standard of living can we afford to retain?

We can be grateful that, while past societies lacked archaeologists and television, today TV documentaries and books are able to show us in graphic detail how past societies collapsed. It follows that we have the opportunity to learn from the mistakes of peoples in the past.⁴⁵

In this view, we have the advantages of comparative knowledge, technically advanced media, and a range of admirable human qualities. Yet this does not explain our long-standing cultural my-

opia or why, equipped with these resources, we still appear committed to an “overshoot and collapse” trajectory. To find such an explanation suggests that we must look deeper into ourselves and into the workings of advanced societies.

The Contemporary Meaning of “Overshoot and Collapse”

The *Limits to Growth* study has been critiqued for its technocratic emphasis, its lack of engagement with affected constituencies, its assumptions regarding the efficacy of market mechanisms, and its relative lack of attention to the social, economic and political dimensions of issues such as climate change.⁴⁶ These criticisms are certainly valid but do not materially detract from its overall significance. For one thing the LtG study was, in itself, a wake-up call, an invitation to a wider debate and to a more adequate view of humanity and its place in the world.

For another, it did, in fact, anticipate two of the greatest challenges of our time—climate change (caused by CO₂ overwhelming natural “sinks”) and resource depletion (of which “peak oil” is the prime example). Both were sanctioned by a careless profiteering mentality that remained ignorant of global limits and sponsored forms of development that led directly to the current impasse.

The main conclusion to be drawn from these accounts is that humanity is indeed living a long way beyond its means and has been doing so for quite a while. The cultural triumphalism often expressed by those currently in power looks both foolish and empty when viewed in this light. The human species is consuming natural capital at a frightening rate rather than living on renewable interest. Wherever we care to look, the evidence is clear. In general terms the presence of over 6 billion people is degrading the Earth and reducing its capacity to support life. But this is not merely a question of raw numbers. Different populations clearly exert different impacts, and the currently affluent are quite clearly consuming

more of their earth share than is just or wise.⁴⁷

For some time the IPAT formula has been used to give an approximation of the different impacts associated with people of different living standards. Impact was held to be a multiplier of Population × Affluence × Technology. In 2009, George Monbiot suggested that a more accurate rendering would be ICAT, or Impact = Consumers × Affluence × Technology. Quoting recent research, he argued that “There’s a weak correlation between global warming and population growth” and “a strong correlation between global warming and wealth.”

And yet he was unable to “find any campaign whose sole purpose is to address the impacts of the very rich.”⁴⁸ This identifies a major contradiction since a great deal of affluent consumption is learned behavior based on faulty assumptions about people and their world.

Overall, humanity is undermining the web of life that evolved here and that existed for millennia before humans appeared on the scene. It is not necessary to buy into any strong version of Gaian mythology to recognize that this living web, which has passed through numerous ancient cataclysms and created the very foundations of our own lives and being, is an unparalleled gift from deep time that is—or should be—regarded as being of incalculable intrinsic value.

It is profoundly ironic that some earlier cultures did recognize this. It follows that it is incorrect to imagine that those of us who are part of the most technically powerful civilization in history could ever imagine that we have the right to destroy or degrade any part of it.

Yet whether we look at the story of the oceans, forests, reefs, birds, or melting glaciers, different fragments of the same story are reflected back at us.⁴⁹ Humanity has become a global force in its own right but is still thinking and behaving as if it lived on a world without limits that could continue to absorb impacts and insults of all kinds without consequence.

The same games of dominance and power that our species has enacted over centuries are still being played out as if the Earth were infinitely resilient. But we now know it is not. Even Machiavelli, an uncompromising master of strategy, recognized the importance of timely foresight as long ago as the sixteenth century.⁵⁰ Now the signals of distress from the global system are neither rare nor esoteric but plentiful and increasingly obvious.

There are also, of course, large numbers of people living in poverty, and their diminished means prevent them from reading the signals of change and dealing with the encroaching global emergency. In many cases they are already experiencing the early manifestations of climate change: unreliable rains, falling or unreliable river flows, vanishing fisheries, and so on. Those who live in affluent circumstances tend to have a somewhat higher level of awareness and understanding but, on the whole, choose not to respond.

We also know that our civilization was not only built by exploiting fossil fuels but continues to rely on them even as supplies of oil diminish and the costs of global warming from CO₂ pollution escalate. In these circumstances E.O. Wilson's suggestion that human beings may be "hard wired" to respond only to short term and immediate stimuli and hence are destined to fail makes some sense. But, fortunately for us, that view is only one part of the story. We also need to look more closely at where our responses to global challenges originate and also how they are conditioned through invisible—but immensely powerful—sociocultural forces.

Let us, however, be clear about one thing. The notion of overshoot and collapse is no longer a distant hypothesis. Rather, it is a structural reality, an unavoidable part of the world in which we live.

And here we need to register a couple of important caveats, one of which has already been mentioned. First, the above analysis is by no means a "gloom and doom" conclusion. Rather,

it contains within it seeds of considerable promise. Second, the concept of "collapse" is by no means as monolithic or settled as it may at first appear. It is, in fact, a kind of blanket term that actually conceals a wide range of opportunities for intervention and choice that are thus far little understood or explored.

Fortunately for us, these considerations offer hope in several challenging and surprising directions. But only if we can first find the breadth of vision and the courage to face the facts of our global situation and acknowledge the need for dramatic changes in our present behaviors and in many of the traditional values that underlie them.

Notes

1. Richard Slaughter, *The Biggest Wake Up Call in History* (Brisbane: Foresight International, 2010).
2. Dennis Meadows, Donella Meadows, and Jorgen Randers, *The Limits to Growth* (New York: Universe Books, 1972).
3. *Ibid.*, p. 51.
4. Science Policy Research Unit, "The Limits to Growth Controversy" Guildford: IPC Business Press, *Futures*, 5, 1, (1973).
5. Meadows, 1972, op cit 153-4.
6. Dennis Meadows, Donella Meadows, and Jorgen Randers, *Beyond the Limits* (London: Earthscan, 1992).
7. *Ibid.*, 137.
8. *Ibid.*, 137.
9. *Ibid.*, 180.
10. *Ibid.*, 216.
11. *Ibid.*, 224-236.
12. Dennis Meadows, Donella Meadows, and Jorgen Randers, *Limits to Growth—30 Year Update* (London: Earthscan, 2005).
13. *Ibid.*, 203.
14. *Ibid.*, 178.
15. *Ibid.*, 235-63.
16. Jorgen Randers, "Global Collapse—Fact or Fiction?" *Futures* 40 (2008) 853-864.
17. *Ibid.*, 853.
18. *Ibid.*, 857. The author cites the collapse of the former

- Soviet Union as a recent example that fits his particular formulation of the issue. But this is best seen as a relatively minor forerunner of the larger breakdowns to come on a much wider scale.
19. Michael Wackernagel, quoted in Randers, 2008, p. 859.
 20. For example: uncertainty about climate science, the perceived high cost of action, the tragedy of the climate commons, legitimate unwillingness among the poor to commit, etc. (ibid., 861).
 21. Graham Turner, "A Comparison of the Limits to Growth with Thirty Years of Reality," *Socio-Economics and the Environment in Discussion* Canberra: CSIRO Working Paper Series, (2008-9).
 22. Ibid., 2, 13 and 14.
 23. Ibid., 34.
 24. Ibid., 37.
 25. Ibid., 38.
 26. See Josh Eastin, Reiner Grundmann, and Aseem Prakesh, "The Two Limits Debates: 'Limits to Growth' and Climate Change," Oxford: Elsevier, *Futures*, 2011, forthcoming. The authors compare the LtG study with current climate change initiatives and conclude that both are too focused on scientific variables (such as emissions reduction targets). They argue for a greater focus on social, economic, and political dimensions of these issues.
 27. Johan Rockstrom, "A Safe Operating Space for Humanity," *Nature*, 461: 24 (September 2009) 472-6. Also at: <http://www.anu.edu.au/climatechange/wp-content/uploads/2009/09/472-475planetaryboundaries.pdf>. Accessed October 29, 2009.
 28. Ibid., 475.
 29. Fred Pearce, F. "Earth's Nine Lives," *New Scientist*, (February 27, 2010) 30-35.
 30. Ibid., 35.
 31. James Lovelock, *The Revenge of Gaia* (London: Allen Lane, 2006) 105.
 32. Ibid., 155.
 33. Ibid., 60.
 34. Ibid., 137.
 35. Ibid., 142.
 36. Ibid., 150.
 37. Peter Ward, "Gaia's Evil Twin," *New Scientist* (June 20, 2009) 28-31.
 38. Ibid., 30-31.
 39. Joseph Tainter, *The Collapse of Complex Societies* (Cambridge: Cambridge University Press, 2008, 1988).
 40. Jared Diamond, *Collapse: How Societies Choose to Succeed or Fail* (New York: Viking, 2005).
 41. Ibid., 421-7.
 42. Ibid., 498.
 43. Ibid., 509.
 44. Ibid., 517.
 45. Ibid., 521-525.
 46. Eastin, et al, 2010.
 47. Herb Kempth, *How the Rich are Destroying the Earth* (Chelsea Green, 2008).
 48. George Monbiot, "The Poor Will Not Destroy the Planet," *Guardian Weekly* (October 9, 2009) 19.
 49. The executive summary of Will Steffen, et al, *Global Change and the Earth System: A Planet Under Pressure* (Heidelberg, Germany: Springer Verlag, 2004) provides ample evidence of impacts on a global scale. For example: "In terms of key environmental parameters, the Earth System has recently moved well outside the range of the natural variability exhibited over at least the last half million years. The nature of changes now occurring simultaneously in the Earth System, their magnitudes and rates of change are unprecedented in human history and perhaps in the history of the Earth." p. 4. <http://www.igbp.net/booklaunch/book.html>. Accessed June 11, 2009.
 50. "When trouble is sensed well in advance it can easily be remedied; if you wait for it to show itself any medicine will be too late because the disease will have become incurable." ... "As the doctors say of a wasting disease, to start with it is easy to cure but difficult to diagnose; after a time, unless it has been diagnosed and treated at the outset, it becomes easy to diagnose but difficult to cure..." "So it is in politics. Political disorders can be quickly healed if they are seen well in advance (and only a prudent ruler has such foresight); when, for lack of a diagnosis, they are allowed to grow in such a way that everyone can recognise them, remedies are too late." Niccolo Machiavelli, *The Prince*, 1516 (London: Penguin, 1961) 12.