



June 2015

Growing, Growing, Gone: Reaching the Limits

An Interview with Dennis Meadows

The Limits to Growth, released in 1972, has profoundly influenced environmental research and discourse over the past four decades. Allen White of the Tellus Institute talks with Dennis Meadows, one of its co-authors, about the genesis of the report and its lessons for understanding and managing our uncertain and perilous global future.

The *Limits to Growth* report was a project of the Club of Rome. How did the Club of Rome become involved with global scenario work?

The origins of the Club of Rome can be traced back to a keynote speech by Italian industrialist Aurelio Pecci in 1965 at the first meeting of Adela, an investment partnership of banks and multinational corporations working on development in Latin America. His speech caught the attention of a number of prominent people—Russians, Brits, Americans—and triggered a discussion around some of the most prominent global issues of the day, such as poverty and the arms race.

That cluster of individuals soon coalesced into the Club of Rome, which got its name from the location of its formative meeting. The Club embraced scenarios work via Erich Jantsch, an Austrian futurist, and Hasan Özbekhan, a global systems professor at the Wharton School of Business. Özbekhan submitted a large proposal to study these global problems to the Volkswagen Foundation, on whose board one of the Club's members served. The Volkswagen Foundation was interested in the idea behind the proposal, but rejected the proposal itself, telling the group to come back with a revised version.

Carroll Wilson, another member of the Club of Rome and a senior instructor at MIT, approached Jay Forrester, a pioneer in systems dynamics and a colleague at MIT. Jay introduced members of the Club to MIT's early work in system dynamics, and they liked what they heard.

Using this new perspective, I revised the proposal and sent it back to the Volkswagen Foundation. Funding followed shortly thereafter, and *The Limits to Growth* was underway.

The *Limits to Growth* report focused on natural resource demands, pollution, and population growth, yet the Club of Rome's initial focus was more on weapons, nuclear proliferation, and security. What prompted this shift?

The shift stemmed from Jay Forrester's insight that the issues about which we were talking then (and still talk about today)—hunger, poverty, oil depletion, climate change—are not in themselves problems; they are symptoms. The problem is continued material growth in a physically finite world.

Continual physical growth of population and economic activity eventually reaches the point where the globe simply cannot accommodate anymore. Biophysical systems press back, whether through disease, scarcity, climate, or other response mechanisms. These pressures are danger signals, indicating overshoot of some aspect of the planet's physical limits.

It is very frustrating to me to hear people talking about starvation as a problem and then say that the way to solve it is by producing more food. The only way we are ever going to have adequate food is by stabilizing the population. Regardless of genetic modifications, food subsidies, or improved storage techniques, as long as population continues to grow, we will eventually overshoot our capacity to feed the world.

Upon publication in 1972, *The Limits to Growth* triggered intense discussion and debate in academic and policy circles. How would you characterize this spectrum of reactions?

First of all, one common misconception about our report was and is that we proved the existence of limits. Our model assumed the existence of limits and then traced out the implications. Available data, however, were sufficient to identify and roughly quantify such limits.

It is also important to understand the nature of the controversy surrounding the report. At the risk of oversimplification, there are two kinds of people: those who decide which salient facts they like and then try to trace their implications, and those who decide which implications they like and then look for salient facts to justify them. You see this distinction in full display in contemporary debates around climate change.

The economics profession is based on the assumption that continual growth is possible and desirable. Likewise, most politicians have a predisposition for growth because it makes the problems they address—unemployment, poverty, diminished tax bases—more tractable. Instead of having to divide a fixed pie, which gets you in trouble with some constituents, you can grow the pie so that nobody has to make a sacrifice or compromise. So there was—and is—a set of vested interests in the notion of growth.

Economists claimed that we were underestimating the power of the market or technological innovation, and some politicians argued that we were trying to block the development of the poor. However, after four or five years, people lost interest in the debate, and public discourse

returned to its traditional short-term, siloed form. In 1992, we came out with the second edition of *The Limits to Growth*, and there was again a brief, but now much smaller, effort to discredit the work.

In light of the early danger signals that had already appeared by then—ozone depletion, oil shortages, toxic loadings—why was the reaction so muted?

The first edition was published in thirty-five foreign language editions; the second edition, in fifteen. The number of articles referencing or criticizing *Limits* in the 1970s was probably ten times what it was in the 1990s. The economists and politicians simply felt less threatened by our analysis the second time around. From their perspective, it was not worth their effort to challenge our findings. The time horizon of politicians and economists was shorter than ever, whereas our analysis focused on longer-term issues.

Were there any regional differences in reaction, e.g., between the US and Europe or between developed and developing countries?

Yes. Of course, when we talk about developing countries, we are dealing with a very diverse group. But, viewed together, the developing countries basically said, “You are the ones who caused the problems, and you have to solve them. Our goal is to develop. And don’t use this kind of analysis to block us from causing the same problems that you caused.”

The Europeans have always been more receptive to the type of analysis found in *The Limits to Growth*. For example, I get many more invitations to speak in Europe than I do in the US. The sales of the book were greater in several European countries than they were in the US. You also see this reflected in legislation. The precautionary principle has substantial standing in Europe, but it is typically dismissed in the United States.

A third edition appeared in 2004. What insights did it offer thirty years after the original?

In the second and third editions, we revisited our findings, looked at how global trajectories were unfolding, and compared them with our forecasts. Generally speaking, our forecasts were borne out. Last year, Graham Turner of the Melbourne Sustainable Society Institute (and formerly of the Commonwealth Scientific and Research Organisation) analyzed the predictions in *The Limits to Growth* and found that our business-as-usual forecasts for population growth, economic growth, and environmental impacts have been fairly accurate.¹

Does the current work on planetary boundaries signal the prescience of *The Limits to Growth*?

I admire very much the research on ecological footprints and planetary boundaries by Matthias Wackernagel, Johan Rockström, and others. They are dealing with these issues at a level of detail that was not possible back in the 1970s.

Our interests, however, are somewhat different, and I would say that there has not been, to my knowledge, anyone who has focused on our core question, that is, the dynamics of growth in a finite world. Although a recent article on planetary boundaries traces out the future dynamic implications of limits, much of the work in that field focuses only on the limits themselves and our proximity to them.²

Were we prescient? In the 1950s, Harrison Brown's books dealt with the issue of limits without using a computer model. Two centuries ago, Thomas Malthus famously projected a clash between population growth and food provision, albeit in a simplistic way. The ancient literature, too, contains references to the limits to growth and consequences of violating them. Our insights were not unique or unprecedented, but our modeling was.

The GT scenario is rooted, in part, in normative modeling: choosing targets and back-engineering pathways to achieve the desired outcomes. Do you see normative modeling or extrapolative modeling as more powerful for inspiring corrective action?

I think we are now in a situation where it doesn't make much difference what we want to see happen fifty years from now.

White water rafting provides a useful analogy here. When you are going down the river, most of the time it is placid, but every once in a while, you hit the rapids. When it is placid, you can sit back and think where you want to be, how you should time your journey, where you want to stop for lunch, etc. When you are in the rapids, you focus on the moment, desperately trying to keep your boat upright until you return to quiet waters. During the placid moments, it is very useful to have a discussion about where you want to be tomorrow or the day after. When you are in the rapids, you don't have the luxury of that kind of discussion. You are trying to survive. Our society has moved into the rapids phase.

Climate change is an example of this. There was a period where we had some possibility of influencing future climate by our decisions about the use of fossil fuels. I think that time has passed. Climate change is increasingly dominated by a set of feedback loops—like the methane cycle and the melting of Arctic ice sheets—which are beyond human control. They have come to be the drivers of the system. The dominant drivers of the system are not people sitting around trying to reach a consensus about which of several different possible outcomes they most prefer.

Any modeling exercise is rife with uncertainty. Under such circumstances, some lean toward optimism, others—like yourself—toward pessimism. What underlies this divergence?

Our research and reports are neither optimistic nor pessimistic; they are realistic. In my professional life, I lay out our assumptions, support them with empirical data, and then use computer simulations to trace their implications for the future behavior of the system. When

the simulations show that current trends cannot be continued, people with a vested interest in current trends may become pessimistic; I do not. In my personal life, I hope for the best and prepare for the worst.

Do you think that the role of modeling has been diminished in its capacity to influence the minds of those who make big decisions? Is there model fatigue?

Models have less influence, and there is certainly model fatigue. However, I never thought that models truly change anybody's mind. What they do is provide ammunition, and perhaps an enhanced vocabulary, to the people who already agree with your conclusions.

I have always said that modeling is a process that creates and legitimates an expert. I used to run a graduate program that trained computer modelers. We looked at global problems like resource constraints and economic growth. When my students used good, disciplined modeling to understand something—say, a depressed milk price in Vermont or the destruction of agricultural land—they made themselves into experts. Modeling, if done well, is an efficient way to accumulate expertise on an issue.

By and large, modeling does not change people's viewpoints. If somebody thinks that nuclear power is a bad idea, and if I make a model which shows that nuclear power is a bad idea, that person will be more than enthusiastic to embrace my models. But if I made a model that says nuclear is a good idea, that person is just going to reject my analysis.

In the next few decades, if we maintain our current trajectory, we are destined to overshoot multiple planetary limits. In the face of this reality, how do we move forward?

Conventional oil production peaked around 2006. Unconventional oil production, e.g., fracking and tar sands, has continued some degree of growth, but it is a totally different matter. Conventional oil is inexpensive and yields a relatively high energy return on investment. Unconventionals don't do that. They are expensive, and the net energy return on investment is quite low.

When you don't have conventional energy sources like oil, you cannot sustain the kind of economic growth rates that we have seen in the past. As a practical matter, then, there is now very little real wealth generation. Most of the economic activity these days consists of those who have more power getting richer by taking away from those with less. This is why we see widening gaps between rich and poor.

Many of the futures, including some of Tellus's, presume large-scale energy consumption of one kind or another. It is energy intensive to coordinate and motivate large assemblies of people and organizations. Absent abundant, cheap energy, this becomes more difficult. I expect that the trend towards global integration is going to stop and then start to recede.

In my own work, I have shifted from a preoccupation with sustainable development, which is somewhat of an oxymoron, toward the concept of resilience. I think that is the future: to understand how different scales—the household, the community, the school—can structure themselves in a way to become more resilient in the face of the shocks that are inevitable regardless what our goals might be.

You see the climate debate evolving this way. Talk about prevention is on the wane, giving way to talk of adaptation. Adaptation really means resilience. It is about designing actions for dealing with New York City the next time superstorms threaten to paralyze the city or for figuring out what California can do if the current drought continues for many more years, or even decades.

Aspirations and good fortune will get us only so far. Human survival cannot risk reliance on them alone.

Endnotes

1. Graham Turner, *Is Global Collapse Imminent? An Update to Limits to Growth with Historical Data* (Melbourne: Melbourne Sustainable Society Institute, 2014), http://ec.europa.eu/environment/ecoap/about-eco-innovation/research-developments/eu/limits-to-growth-predictions-borne-out-analysis-finds_en.htm.
2. Michael Gerst, Paul Raskin, and Johan Rockström, "Contours of a Resilient Global Future," *Sustainability* 6 (2014): 123-135, <http://www.mdpi.com/2071-1050/6/1/123>.

About the Interviewee



Dennis Meadows is Emeritus Professor at the University of New Hampshire, where he was Director of the Institute for Policy and Social Science Research. He has received numerous awards and is the recipient of four honorary doctorates for his contributions to environmental education. He co-authored the pioneering 1972 book *The Limits to Growth*, which analyzed the long-term consequences of unconstrained resource consumption driven by population and economic growth on a finite planet. In 2009, he was awarded the Japan Prize for his contribution to “the transformation towards a sustainable society in harmony with nature.” Dr. Meadows co-founded The Balaton Group in 1982, an international network of researchers and practitioners in fields related to systems and sustainability, published several educational games and books, and co-authored updates to *The Limits to Growth* in 1992 and 2004.

About the Publication

Published as an Interview by the [Great Transition Initiative](#).

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Cite as Dennis Meadows, “Growing, Growing, Gone: Reaching the Limits,” interview by Allen White, *Great Transition Initiative* (June 2015).

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