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Beyond The Limits To Growth

A new update to *The Limits to Growth* reveals that we are closer to "overshoot and collapse" - yet sustainability is still an achievable goal

by by Donella H. Meadows, Dennis L. Meadows, and Jørgen Randers

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"Grow or die," goes the old economic maxim. But in 1972 a team of systems scientists and computer modelers challenged conventional wisdom with a ground-breaking study that warned that there were limits - especially environmental limits - to how "big" human civilization and its appetite for resources could get. Beyond a certain point, they said in effect, the maxim could very well be "grow and die."

That same team of researchers (minus one) has just released an historic update to The Limits to Growth. The new book - Beyond the Limits: Confronting Global Collapse, Envisioning a Sustainable Future - is instant must-reading. The authors use updated computer models to present a comprehensive overview of what's happening to the major systems on planet Earth and to explore probable futures, from worst- to best-case scenarios. The book is rigorously scientific, yet very engaging, and it is especially well-suited to educational settings. We strongly recommend it to our readers, and present the Preface here.

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Twenty years ago we wrote a book called *The Limits to Growth*. It described the prospects for growth in the human population and the global economy during the coming century. In it we raised questions such as: What will happen if growth in the world's population continues unchecked? What will be the environmental consequences if economic growth continues at its current pace? What can be done to ensure a human economy that provides sufficiently for all and that also fits within the physical limits of the Earth?

We had been commissioned to examine these questions by The Club of Rome, an international group of distinguished businessmen, statesmen, and scientists. They asked us to undertake a two-year study at the Massachusetts Institute of Technology to investigate the long-term causes and consequences of growth in population, industrial capital, food

production, resource consumption, and pollution. To keep track of these interacting entities and to project their possible paths into the future we created a computer model called World3.

The results of our study were described for the general public in *The Limits to Growth*. That book created a furor. The combination of the computer, MIT, and The Club of Rome pronouncing upon humanity's future had an irresistible dramatic appeal. Newspaper headlines announced:

A COMPUTER LOOKS AHEAD AND SHUDDERS

STUDY SEES DISASTER BY YEAR 2100

SCIENTISTS WARN OF GLOBAL CATASTROPHE.

Our book was debated by parliaments and scientific societies. One major oil company sponsored a series of advertisements criticizing it; another set up an annual prize for the best studies expanding upon it. *The Limits to Growth* inspired some high praise, many thoughtful reviews, and a flurry of attacks from the left, the right, and the middle of mainstream economics.

The book was interpreted by many as a prediction of doom, but it was not a prediction at all. It was not about a preordained future. It was about a choice. It contained a warning, to be sure, but also a message of promise. Here are the three summary conclusions we wrote in 1972. The second of them is the promise, a very optimistic one, but our analysis justified it then and still justifies it now. Perhaps we should have listed it first.

1. If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next 100 years. The most probable result will be a sudden and uncontrollable decline in both population and industrial capacity.
2. It is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable far into the future. The state of global equilibrium could be designed so that the basic material needs of each person on earth are satisfied and each person has an equal opportunity to realize his or her individual human potential.
3. If the world's people decide to strive for this second outcome rather than the first, the sooner they begin working to attain it, the greater will be their chances of success. (Meadows et al., 1972)

To us those conclusions spelled out not doom but challenge - how to bring about a society that is materially sufficient, socially equitable, and ecologically sustainable, and one that is more satisfying in human terms than the growth-obsessed society of today.

In one way and another, we've been working on that challenge ever since. Millions of other people have been working on it too. They've been exploring energy efficiency and new materials, nonviolent conflict resolution and grassroots community development, pollution prevention in factories and recycling in towns, ecological agriculture and international protocols to protect the ozone layer. Much has happened in twenty years to bring about technologies, concepts, and institutions that can create a sustainable future. And much has happened to perpetuate the desperate poverty, the waste of resources, the accumulation of toxins, and the destruction of nature that are tearing down the support capacity of the earth.

When we began working on the present book, we simply intended to document those countervailing trends in order to update *The Limits to Growth* for its reissue on its twentieth anniversary. We soon discovered that we had to do more than that. As we compiled the numbers, reran the computer model, and reflected on what we had learned over two decades, we realized that the passage of time and the continuation of many growth trends had brought the human society to a new position relative to its limits.

In 1971 we concluded that the physical limits to human use of materials and energy were somewhere decades ahead. In 1991, when we looked again at the data, the computer model,

and our own experience of the world, we realized that in spite of the world's improved technologies, the greater awareness, the stronger environment policies, many resource and pollution flows had grown beyond their sustainable limits.

That conclusion came as a surprise to us, and yet not really a surprise. In a way we had known it all along. We had seen for ourselves the leveled forests, the gullies in the croplands, the rivers brown with silt. We knew the chemistry of the ozone layer and the greenhouse effect. The media had chronicled the statistics of global fisheries, groundwater drawdowns, and the extinction of species. We discovered, as we began to talk to colleagues about the world being "beyond the limits," that they did not question that conclusion. We found many places in the literature of the past twenty years where authors had suggested that resource and pollution flows had grown too far, some of which we have quoted in [our] book.

But until we started updating *The Limits to Growth* we had not let our minds fully absorb the message. The human world is beyond its limits. The present way of doing things is unsustainable. The future, to be viable at all, must be one of drawing back, easing down, healing. Poverty cannot be ended by indefinite material growth; it will have to be addressed while the material human economy contracts. Like everyone else, we didn't really want to come to these conclusions.

But the more we compiled the numbers, the more they gave us that message, loud and clear. With some trepidation we turned to World3, the computer model that had helped us twenty years before to integrate the global data and to work through their long-term implications. We were afraid that we would no longer be able to find in the model any possibility of a believable, sufficient, sustainable future for all the world's people.

But, as it turned out, we could. World3 showed us that in twenty years some options for sustainability have narrowed, but others have opened up. Given some of the technologies and institutions invented over those twenty years, there are real possibilities for reducing the streams of resources consumed and pollutants generated by the human economy while increasing the quality of human life. It is even possible, we concluded, to eliminate poverty while accommodating the population growth already implicit in present population age structures - but not if population growth goes on indefinitely, not if it goes on for long, and not without rapid improvements in the efficiency of material and energy use and in the equity of material and energy distribution.

As far as we can tell from the global data, from the World3 model, and from all we have learned in the past twenty years, the three conclusions we drew in *The Limits to Growth* are still valid, but they need to be strengthened. Now we would write them this way:

1. Human use of many essential resources and generation of many kinds of pollutants have already surpassed rates that are physically sustainable. Without significant reductions in material and energy flows, there will be in the coming decades an uncontrolled decline in per capita food output, energy use, and industrial production.
2. This decline is not inevitable. To avoid it two changes are necessary. The first is a comprehensive revision of policies and practices that perpetuate growth in material consumption and in population. The second is a rapid, drastic increase in the efficiency with which materials and energy are used.
3. A sustainable society is still technically and economically possible. It could be much more desirable than a society that tries to solve its problems by constant expansion. The transition to a sustainable society requires a careful balance between long-term and short-term goals and an emphasis on sufficiency, equity, and quality of life rather than on quantity of output. It requires more than productivity and more than technology; it also requires maturity, compassion, and wisdom.

These conclusions constitute a conditional warning, not a dire prediction. They offer a living choice, not a death sentence. The choice isn't necessarily a gloomy one. It does not mean that the poor must be frozen in their poverty or that the rich must become poor. It could actually mean achieving at last the goals that humanity has been pursuing in continuous attempts to maintain physical growth.

We hope the world will make a choice for sustainability. That is why we have written our book. But we do not minimize the gravity or the difficulty of that choice. We think a

transition to a sustainable world is technically and economically possible, maybe even easy, but we also know it is psychologically and politically daunting. So much hope, so many personal identities, so much of modern industrial culture has been built upon the premise of perpetual material growth.

A perceptive teacher, watching his students react to the idea that there are limits, once wrote:

When most of us are presented with the ultimata of potential disaster, when we hear that we "must" choose some form of planned stability, when we face the "necessity" of a designed sustainable state, we are being bereaved, whether or not we fully realize it. When cast upon our own resources in this way we feel, we intuit, a kind of cosmic loneliness that we could not have foreseen. We become orphans. We no longer see ourselves as children of a cosmic order or the beneficiaries of the historical process. Limits to growth denies all that. It tell us, perhaps for the first time in our experience, that the only plan must be our own. With one stroke it strips us of the assurance offered by past forms of Providence and progress, and with another it thrusts into our reluctant hands the responsibility for the future. (Vargish, 1980)

We went through that entire emotional sequence - grief, loneliness, reluctant responsibility - when we worked on The Club of Rome project twenty years ago. Many other people, through many other kinds of formative events, have gone through a similar sequence. It can be survived. It can even open up new horizons and suggest exciting futures. Those futures will never come to be, however, until the world as a whole turns to face them. The ideas of limits, sustainability, sufficiency, equity, and efficiency are not barriers, not obstacles, not threats. They are guides to a new world. Sustainability, not better weapons or struggles for power or material accumulation, is the ultimate challenge to the energy and creativity of the human race.

We think the human race is up to the challenge. We think that a better world is possible, and that the acceptance of physical limits is the first step toward getting there. We see "easing down" from unsustainability not as a sacrifice, but as an opportunity to stop battering against the earth's limits and to start transcending self-imposed and unnecessary limits in human institutions, mindsets, beliefs, and ethics. That is why we finally decided not just to update and reissue *The Limits to Growth*, but to rewrite it completely and to call it *Beyond the Limits*.

References

Donella H. Meadows et al., *The Limits to Growth* (New York: Universe Books, 1972).

Thomas Vargish, "Why the Person Sitting Next to You Hates *Limits to Growth*," *Technological Forecasting and Social Change* 16 (1980), pp. 179-189.

Love And The Revolution

Unlike most scientific books about our relationship to the environment, Beyond the Limits is willing to break several taboos. For one, it is willing to be optimistic - to say that it is possible to overcome the manifold obstacles between here and sustainability. For another, it is willing to use words like "love" and "revolution," meaning by the latter not a violent uprising but an historical transformation, not unlike that from agricultural to industrial civilization.

What are the elements of the sustainability revolution? They go beyond good information, new technologies, democratic participation, and sound policy. The authors close their book with a description of five "tools" that are generally not mentioned in most supposedly "serious" studies of what we must do: visioning, networking, truth-telling, learning, and - as they explain in this excerpt - loving.

One is not allowed in the modern culture to speak about love, except in the most romantic and trivial sense of the world. Anyone who calls upon the capacity of people to practice brotherly and sisterly love is more likely to be ridiculed than to be taken seriously. The deepest difference between optimists and pessimists is their position in the debate about

whether human beings are able to operate collectively from a basis of love. In a society that systematically develops in people their individualism, their competitiveness, and their cynicism, the pessimists are the vast majority.

That pessimism is the single greatest problem of the current social system, we think, and the deepest cause of unsustainability. A culture that cannot believe in, discuss, and develop the best human qualities is one that suffers from a tragic distortion of information. "How good a society does human nature permit?" asked psychologist Abraham Maslow. "How good a human nature does society permit?"

... It is difficult to speak of or to practice love, friendship, generosity, understanding, or solidarity within a system whose rules, goals, and information streams are geared for lesser human qualities. But we try, and we urge you to try. Be patient with yourself and others as you and they confront the difficulty of a changing world. Understand and empathize with inevitable resistance; there is some resistance, some clinging to the ways of unsustainability, within each of us. Include everyone in the new world. Everyone will be needed. Seek out and trust in the best human instincts in yourself and in everyone. Listen to the cynicism around you and pity those who believe it, but don't believe it yourself.

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