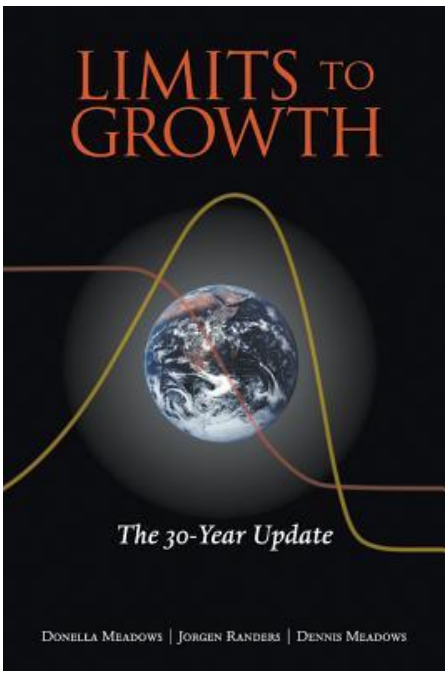

The Limits to Growth: The 30-Year Update

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

The Limits to Growth: The 30-Year Update

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

The Limits to Growth: The 30-Year Update Donella H. Meadows , Dennis L. Meadows , Jørgen Randers In 1972, three scientists from MIT created a computer model that analyzed global resource consumption and production. Their results shocked the world and created stirring conversation about global 'overshoot,' or resource use beyond the carrying capacity of the planet. Now, preeminent environmental scientists Donnella Meadows, Jorgen Randers, and Dennis Meadows have teamed up again to update and expand their original findings in The Limits to Growth: The 30 Year Global Update.

Meadows, Randers, and Meadows are international environmental leaders recognized for their groundbreaking research into early signs of wear on the planet. Citing climate change as the most tangible example of our current overshoot, the scientists now provide us with an updated scenario and a plan to reduce our needs to meet the carrying capacity of the planet.

Over the past three decades, population growth and global warming have forged on with a striking semblance to the scenarios laid out by the World3 computer model in the original Limits to Growth. While Meadows, Randers, and Meadows do not make a practice of predicting future environmental degradation, they offer an analysis of present and future trends in resource use, and assess a variety of possible outcomes.

In many ways, the message contained in Limits to Growth: The 30-Year Update is a warning. Overshoot cannot be sustained without collapse. But, as the authors are careful to point out, there is reason to believe that humanity can still reverse some of its damage to Earth if it takes appropriate measures to reduce inefficiency and waste.

Written in refreshingly accessible prose, Limits to Growth: The 30-Year Update is a long anticipated revival of some of the original voices in the growing chorus of sustainability. Limits to Growth: The 30 Year Update is a work of stunning intelligence that will expose for humanity the hazy but critical line between human growth and human development.

The Limits to Growth: The 30-Year Update Details

Date	:	Published June 1st 2004 by Chelsea Green Publishing Company (first published January 1st 2004)
ISBN	:	9781931498586
Author	:	Donella H. Meadows , Dennis L. Meadows , Jørgen Randers
Format	:	Paperback 338 pages
Genre	:	Science, Nonfiction, Economics, Environment, Sustainability, Politics, Biology, Ecology

Dennis L. Meadows , Jørgen Randers

From Reader Review The Limits to Growth: The 30-Year Update for online ebook

Cambridge Programme for Sustainability Leadership says

One of Cambridge Sustainability's Top 50 Books for Sustainability, as voted for by our alumni network of over 3,000 senior leaders from around the world. To find out more, click here.

As a commissioned report to the Club of Rome, The Limits to Growth uses a computer simulation model developed at MIT to investigate five major trends of lgobal concern: accelerating industrialisation, rapid population growth, widespread malnutrition, depletion of non-renewable resources, and a deteriorating environment. The book is revolutionary, not only in challenging modern society's growth obsession, but also in its use of systems dynamics within a sustainability context. This approach recognises that the structure of any system is often as important in determining its behaviour as the individual components.

The authors' subsequent updates, Beyond the Limits (1993) and The 30-Year Update, suggest that the goal of a sustainable society still eludes us.

Tuck says

oh fuck. these folks were spot on when they wrote in 1972 that our consumption and pollution would catch up with the earth's ability to absorb it without drastic repercussions. while the authors didn't take into account class, politics, capitalism, or violence (they said it was too variable to lump in gross generalizations into their systems analysis so left those out, and made it "a-political", but this really needs to be added in, say for example you are super rich, have a house in tahoe, and manhattan, and feed you dog prime rib and daily doses of valium, and jet set around and drive ROATS, you are impacting earth way more than say if you were an afghan family living in an adobe with no electricity and you ate your pet last winter), they concluded that if us on earth continued polluting and consuming at the 1972 rates, we'd cause catastrophe by 2050. carbon dioxde levels are now 400 ppm and rising, oceans have absorbed so much carbon they are 30% more acidic (causing extinction of little tiny creatures that all the big creatures rely on to eat, and us to eat) so yeah, we're screwed. says dennis meadows, one of the authors, "In the early 1970's, it was possible to believe that maybe we could make the necessary changes. But now it is too late. We are entering a period of many decades of uncontrolled climatic disruption and extremely difficult decline." :(

Wayne Marinovich says

One of the scariest books I have read, and not in a good Steven King kind of way.

It was hard reading due to the sheer number of facts and figures that you need to summarise the plight of our dear planet. But it is 30-year update so was keen to see what progress we have made as humans. In short.... nothing, nada, zip, zero, squat...

Going to be an interesting next 30 years

David Schaafsma says

Updated slightly, 12/1/17 (a few links added, below):

“We must not succumb to despair, for there is still the odd glimmer of hope.” Edouard Saouma, 1993 [And yes, one of my points is that there is remains a little hope, as we approach 2018. My other point is that Meadows wrote this in 1993, a quarter of century ago; those odd glimmers of hope continue, but are growing fainter.]

In 1972 three MIT scientists developed a computer model for examining current trends in global resource production. They updated their report in 1992, and again in 2004 with this book. I didn’t read it in 2004 though I read reviews of it and executive summaries. I read it now. As they have tracked consistently since 1972, the authors show that humans have created a condition they call “overshoot,” (using more than the planet can sustain) which can only lead to global catastrophe. And this is not some little scientific secret; in each version of this report, millions of copies have been sold. The authors aren’t in the practice of making predictions; they show you models for what will happen if you do this or that. And we are—some good news to the contrary—doing almost exclusively “this”—leading to global catastrophe, rather than “that,” which is in earnest beginning what they say is absolutely required, what they call “the revolution of sustainability,” the third revolution after the agricultural and industrial revolutions that profoundly changed the planet.

Their point is that there are still (in 2004, 14 years ago) choices to make:

“People don't need enormous cars; they need admiration and respect. They don't need a constant stream of new clothes; they need to feel that others consider them to be attractive, and they need excitement and variety and beauty. People don't need electronic entertainment; they need something interesting to occupy their minds and emotions. And so forth. Trying to fill real but nonmaterial needs-for identity, community, self-esteem, challenge, love, joy-with material things is to set up an unquenchable appetite for false solutions to never-satisfied longings. A society that allows itself to admit and articulate its nonmaterial human needs, and to find nonmaterial ways to satisfy them, would require much lower material and energy throughputs and would provide much higher levels of human fulfillment.”

This book was written before Trump and his unlimited growth climate deniers were elected/appointed. And the past forty years, the authors cite clearly, has shown climate change to be the most terrifying example of overshoot. The ice caps are melting, fresh water is disappearing, species die-off continues unabated, forests are being wiped out, and only small dents into carbon emissions are being made. Consumer/industrialism capitalism continues at a steady, ominous pace. The Paris Accord was encouraging in its acknowledgement that the threats to catastrophe are real, but for the major contributors to climate change, only baby steps were taken.

What to do? To make the choices we have not yet fully made will require a Marshall Plan-level of global commitment. After all the charts and models, the authors include a chapter that suggests that in addition to science and technological innovation, certain principles will also be necessary for sustainability : Visioning, net-working, truth-telling, learning, and loving.

And they insist that strict industrial and corporate regulations will be necessary to enact a sustainable planet. In the kind of “post-fact” world where this very week Trump has moved to dismantle many regulations he

sees as limiting business growth, it is hard to be optimistic about the future: “Running the same system harder or faster will not change the pattern as long as the structure is not revised.”

If you look world-wide, there are groups of people and even sometimes entire nations moving in the right direction. The foundation for renewable energy resources is being developed in some places at a pace the authors of this volume might have hoped for half a century ago. This is good news. Too little too late? Probably, I write on December, 2017.

The authors wrote this in their 2004 report. I ahem no idea if they also said it in 1972, but things were indeed said like this during that decade about the planet:

“Sustainability is a new idea to many people, and many find it hard to understand. But all over the world there are people who have entered into the exercise of imagining and bringing into being a sustainable world. They see it as a world to move toward not reluctantly, but joyfully, not with a sense of sacrifice, but a sense of adventure. A sustainable world could be very much better than the one we live in today.”

Here is my review of State of the World 2013: Is Sustainability Still Possible? By the Worldwatch Institute:

https://www.goodreads.com/review/show...

There's also this to consider, a warning in November 2017 from the science community:

But then there’s now this: 16,000 scientists sign dire warning to humanity over health of planet:

http://www.cnn.com/2017/11/14/health/...

And then there's this. Lake Chad, in northern Africa, was one of the largest freshwater lakes in the world, the size of New Jersey. It is now 95% gone. Here's an article, out now, 12/2017 about this very real disaster:

Lake Chad was once the size of New Jersey, is now 95 % gone:

https://www.newyorker.com/magazine/20...

Héctor says

"Reading the 30th-year update reminds me of why the systems approach to thinking about our future is not only valuable, but indispensable. Thirty years ago, it was easy for the critics to dismiss the limits to growth. But in today's world, with its collapsing fisheries, shrinking forests, falling water tables, dying coral reefs, expanding deserts, eroding soils, rising temperatures, and disappearing species, it is not so easy to do so. We are all indebted to the Limits team for reminding us again that time is running out."

—Lester Brown, Earth Policy Institute

Hong says

Q: Could you summarize this book?
A: Several scientists built a computer model to forecast the destiny of humanity in 21st century and predict a decline in human welfare (after some decades). This type of overshoot behavior is well-known in any systems that exhibits (i) exponential growth (e.g., ever-increasing rate of resources extraction), (ii) delay mechanism of some sort (e.g., time lag between CFC production and ozone depletion) and (iii) physical limit (earth is finite in size). To avoid societal collapse requires (a) birth rate control, (b) technologies to remove pollution and improve agricultural land, (c) stop material consumerism.

Q: That sounds like bullshit. It's merely a computer model.
A: The authors make no prediction. They are merely pointing out the qualitative behaviors of the system (i.e., human society and ecology). By tuning various parameters (e.g., amount of oil underground), 11 different scenarios were explored. Every scenarios, except one, involves societal collapse. That exceptional case is produced assuming the aforementioned (a)-(c).

Q: I disagree with everything you say. The real world is much more complex than a computer model. For example, when certain resources is getting close to depletion, price goes up, motivating recycling / conservation techs / alternative materials. The world will reach a new equilibrium state anyway.
A: Switching / conservation technologies require time and additional capital. These are considered in the model.
A: No doubt the world will reach a new equilibrium. The question is whether the transition from the current state to this "new equilibrium" is painful.

Q: This is crazy. Why are you giving this book 4 stars?
A: I am interested in the development of human society in the next 50-100 years; this book gives many insights on the problem. It gives me tools to think about human society as a system.

Jacob says

I'm kind of obsessed with the 21st century and what lies in store for humanity in the next 100 years or so. I've read numerous books that predict the overshoot of the Earth's carrying capacity, but this is the first book that looks at the problem with statistical systems approach. The mathematics and profound analysis are what make The Limits to Growth stand out from the crowd. The authors explain (within the confines of their statistical model) exactly what needs to change in order to prevent a environmental and population crash.

As a engineering major, I would have personally liked to see a more in-depth explanation of the mathematics behind the data presented and less ideological discussion. There are other books and authors far more capable of influencing my ideology and motivations. The data speaks for itself.

Adam Jones says

Read the fucking book.

Ryan says

A classic in environmental literature, the tremendous debate and controversy generated when it was first published back in 1972 makes this one of the most famous publications the world has ever seen. For the first time it set a time, albeit a broad range in which our global civilization could collapse as we overshoot the Earth's limits. Basically these can be classified as source limits and sink limits, the former being the natural resources at hand from fossil fuels to raw materials and land, while the latter refers to the planet's ability to absorb the pollution from human activities, be it air, water or land pollution, or greenhouse gases. We will likely run into either the first or second kind, sooner or later, if we continue pursuing perpetual economic growth.

Despite the debates that ensued since the first edition, the world has unfortunately not acted on its dire warnings since then, and this latest edition shows that we are now past the time when action could have easily made a difference to the future. 30 years of dithering and business-as-usual have made the situation more urgent than ever, making our choices and their effects much more limited than if the world had changed its path 20-30 years ago.

The analysis is very systematic and clear, the conclusions convincing. This should definitely be made mandatory reading for every student today, and maybe all politicians as well! The more than ten scenarios run by the model at the heart of this book shows that only if we combine policy, technological advances (such as in efficiency and negating effects of pollution) and the active WILL to curb our desire for more will we even have a small chance of averting disaster. It is therefore difficult and perhaps even idealistic to be optimistic about our future, but there is no other way than pushing on with even the faintest glimmer of hope I suppose.

Sebastien says

The book Limits to Growth views the world through a systems analysis prism. It looks at where we are at in terms of current and potential future earth resource use and waste creation and what the earth can sustain in these arenas. We are in overshoot mode according to the book (we entered this zone back in the 80s according to their data). This is a dangerous mode to be in especially for long periods of time as it increases probability of a collapse occurring.

How solid are the models and science of the book I can't really say, but the overarching themes and arguments seem logical. Given the vast degree to which we are terraforming the earth (for living space, transportation, food, industry), rates of resource extraction, amounts of waste creation, rate of transitioning (too slow) to more sustainable modes of energy, production, consumption, and how we are affecting the climate one has to suspect we are courting disaster by playing with fire, pushing earth systems to their limits, tempting collapse of broad macro-ecosystems which would be catastrophic for global human civilization in all aspects (social, economic, political).

The debate around the book and concept is interesting. There are various critiques of the book worth reading as well to get a sense of what the debate looks like, but the fundamental concepts and problems advanced by the book work well imo, and I'm fairly aligned with the assessments and conclusions the authors of this book

make.

There are three authors: Dana Meadows, Dennis Meadows, and Jorgen Randers. The quotes, see below, are from the authors' preface. And I hate to say this, I'm normally quite an optimistic person but when it comes to this stuff I come down more on the side of Jorgen and Dennis. Doesn't mean I think we are screwed and can't do anything, in fact there is much we can do. But I think if we don't make monumental changes and shifts in policy the major environmental pressures will keep growing eventually forcing a significant downward shift of global civilization, the irretrievable damage we cause to the planet will fundamentally lower and cap what this planet is capable of providing us in terms of potential average human welfare.

Technology can provide buffers, but without proper policy and management of resources and earth systems it will not save us. Imo the idea of tech saving us is just an excuse for us to continue as is, heedless of future consequences that may be irrevocable regardless of what future tech might accomplish. Of course I do think technology will be part of the answer in helping us create and maintain more sustainable systems and mitigating problems we have caused, but I just don't like the blind techno-utopianism that is willing to give us an excuse to continue in a heedless irresponsible manner. Such belief in future tech as the deus ex machina that solves all the problems we caused today gives us carte-blanche to do whatever, blindly continue the status quo, because we think future tech is our ace in the hole that will pull us back from disaster. It's a very risky assumption, such thinking means one is willing to bet on such an unknown future thing when the stakes are so high, the risks of continuing status quo are massive. It's seductive because it shifts all onus and responsibility to the future and the magic of the future generations to solve the problems we caused and perpetuated today. But some (much?) of the damage we cause today will likely prove irrevocable, so that's a bit of an issue with that argument for me.

Sure it's impossible to predict the potential damage of our current status quo, especially in regards to things like climate change which are such wildcards, it is hard to super accurately predict how damaging climate change will ultimately prove. How much will it change broad macro-ecosystems and climate patterns? what will be the degree and magnitude of shifts? everything is so interconnected that these shifts are quite frightening to imagine, the potential cascades... but I think it's safe to assume that continuing our status quo is incredibly risky and we have embarked on a broad and dangerous experiment.

I do try and feed my optimism while hoping to stay grounded in some sort of realistic assessment of actual circumstances and contingencies. We should try and keep building awareness, pushing solutions, living the change we believe in, and explain the vision of what may be possible:

"We promised Dana Meadows before she died in early 2001 that we would complete the “30-year update” of the book she loved so much. But in the process we were once more reminded of the great differences among the hopes and expectations of the three authors.

Dana was the unceasing optimist. She was a caring, compassionate believer in humanity. She predicated her entire life’s work on the assumption that if she put enough of the right information in people’s hands, they would ultimately go for the wise, the farsighted, the humane solution- in this case, adopting the global policies that would avert overshoot (or, failing that, would ease the world back from the brink). Dana spent her life working for this ideal.

Jorgen is the cynic. He believes that humanity will pursue short-term goals of increased consumption, employment, and financial security to the bitter end, ignoring the increasingly clear and strong signals until it is too late. He is sad to think that society will voluntarily forsake the wonderful world that could have been.

Dennis sits in between. He believes actions will ultimately be taken to avoid the worst possibilities for global collapse. He expects that the world will eventually choose a relatively sustainable future, but only after severe global crises force belated action. And the results secured after long delay will be much less attractive than those that could have been attained through earlier action. Many of the planet's wonderful ecological treasures will be destroyed in the process; many attractive political and economic options will be lost; there will be great and persisting inequalities, increasing militarization of society, and widespread conflict."

What do you guys think? where do you guys stand?

Jan-Maat says

This is the book that poses the difficult question of if intelligent life exists on earth. It is an update of the original Limits to Growth and Beyond the Limits with a couple fewer scenarios. The scenarios all model the consequences of the pursuit of growth measured in terms of industrial output, food, and services.

The authors describe the assumptions that go into their computer model and observe that the majority of resulting scenarios result in overshoot and collapse the world as an environmental and economic system, and they discuss a couple of possible overshoot scenarios before taking a break to restore some optimism by looking at the measures taken to deal with CFCs.

The following scenarios answer a series of 'what if' questions that allow them to model the potential outcomes of intervention in reducing pollution or concentrating on agricultural production. These also tend to end badly. It might be amusing to notice that most of the scenarios involve human society eventually being overwhelmed by the legacy of pollution and the degradation of the environment except for those which have very optimistic assumptions or in which radical change started in the 1980s, but for the fact that we're all on-board this ship of fools.

The answer and the difficulty of the problem is inherent in the question. A world view, or a set of values that pursues growth through the deployment of Capital and seeks a return on that Capital in the context of exponential growth, delayed feedback, non-linear cost increases and diminishing returns exercised on a global scale will result in overshoot and collapse. Just as a population of herbivores on an island will also cycle through population explosion and collapse as they breed beyond the carrying capacity of the land.

For the authors, the solution is to escape from the prison of the concept of growth. Which is a cultural change potentially as far-reaching as the industrial or agricultural revolutions. When one considers the world and who has power in it and what power is in the world as it currently is and what growth means to those who have power, one realises that the alcoholics are in charge of the bar and the chance of there being any beer left before they all die of cirrhosis of the liver seems small indeed.

Overall the sense of societies expanding beyond their environmental limits, adopting new technologies leading to increased complexity and vulnerability reminds me of Brian Fagan's account in The Long Summer of the collapse of prehistoric and early societies in the face of climate change with the impact of switching to labour intensive food sources or the prolonged shortage of food is left recorded on the skeletal remains.

The first time I read it, I was disappointed by this book, possibly because I was too excited by its reputation beforehand. The second time through though I was struck by the oddly gentle tone of the prose.

It is full of interesting titbits but for me the most significant realisation arising out of the book is that the movement into post peak production will not be announced by Angels at the world's imagined corners blowing their trumpets on that last and busy day. We are already post peak in terms of world copper production (and have been for most of the 20th century) but life goes on, the adaptation to the change is accepted unconsciously.

It leads me back to thinking about the collapse of the Roman empire in Western Europe. It is from a historical perspective that it stands out as a shocking event but as experienced for people alive at the time it was a process that took place over decades. St. Augustine felt the psychic shock of the sack of Rome in far off Carthage but was it an event that made an immediate difference to his daily life?

Recommended for its discussion of systems and the check-lists to spot if your society is close to overshoot.

Update September 2014: research by The University of Melbourne has found that historical trends from 1972 to 2010 have matched the business as usual model developed in The Limits to Growth fairly closely meaning that we are still on trend for a general onset of collapse events. it is good to know that even in our uncertain times that our propensity to over consume can be still be relied upon.

The paper's author suggests that the recent global financial crisis was related to the on set of collapse - which since even the airy-fairy world of international banking is not completely disconnected from actual physical activities sounds intuitively reasonable.

Ali says

A few years ago when a new iPhone released, my friend asked me: for how long do you think this can go on, producing more and more? At time this didn't seem like a serious issue to me, I thought we can substitute different raw materials with scarce ones and we can recycle more. It took me some time to realize that I was naive and most serious limits on planet earth are not nonrenewable resources but renewable ones and pollution sinks.

Authors have considered growth issue long ago. With the prospects for humanity's long-term future in mind, they designed a computer model in 1972 and published the results. This book is the third update to the original work. It is certain that growth and specially exponential growth can not continue forever on a finite planet and will be halted by planetary limits. Authors believe that we have different options facing these limits. They examine different scenarios: "What would happen if population, affluence, and technology trends began to turn around? What about the ways they are interconnected with each other? What happens if the ecological footprint is reduced by technical change, but then population and capital grow still farther? What happens if the ecological footprint isn't reduced at all?"

The best scenario of model is not what a growth-oriented society would desire. The only way to avoid overshoot and collapse is to accompany technological advances with constraints on population and consumption which will require changing structure of the system. This solution may seem out of reach but as authors mention this the outcome of a very optimistic model: "Model has no military sector to drain capital and resources ... wars ... corruptions ... floods ... surprising environmental failures".

Mbogo J says

The decision to read this was driven more by personal factors rather than the need for information. A while back I had read The Collapse of Complex Societies and gotten the idea to build a model that can predict the collapse of a complex society during my free time. I had hoped to use bio-mimicry of colony collapse in bees and see if it applied to complex societies. Before I had started to jot down research notes, I came across *The Limits to Growth* and was pleasantly surprised that several decades back a team of researchers had come up with a model to predict the trajectory that global civilization might take and the probability of collapse. Naturally, I was curious and decided to have a look.

The most outstanding contribution of this book and more so its original run published in 1972 was bringing to the fore front the idea of environmental impact due to our actions. These days nearly every government has an environmental ministry to keep watch of industries and our way of life, how it impacts the immediate environment, remedies, fines et al. Unfortunately for me the good ends there.

I had a few qualms with their model and how they were freely making 100 year predictions when we know a good model has three good years, 5 may be for the most robust and beyond that initial conditions have changed materially that you need a new model. If that applies to micro models the effect will surely be more pronounced in macro models.... Lets not even go into how the effect of emergent phenomena and complexity might affect global trends. Bottom line is that these criticisms in addition to others raised by other researchers during the initial run of the book call into question the usefulness of the model. It also did not help that they offered very few solutions and the idea of "sustainability" does not hold water. It sounds simple but is very complex in practice. It requires one to come up with peak operation and decide that this level is the sustainable one and future actions should seek to maintain it. This goes counter to human nature which likes progress and abhors stagnation. I could go on and on but I think other writings on the *World 3* provide a better analysis compared to my rantings.

On the sum of things, it is not a good idea to shoot the messengers, their idea that our consumerism is putting the planet in peril pleads its own course. It is unfortunate that several decades later advertising companies still attract the highest valuation. As usual in complex topics such as these we always argue that more should be done but what should be done is the harder question.

E says

Serious critique of contemporary technological society

This book is neither easy nor pleasant reading. However, it is not the purely pessimistic voice of doom or the rabid environmentalist tract that many reviews described when the first edition came out 30 years ago. Rather, it is a sort of cross between a primer on budgeting and the warning a doctor might give to an overweight smoker. A good budget rests on a few simple assumptions: Resources are limited; you must plan for the future; and if you overspend now, you'll run short later. A doctor's report would say, "You may not have symptoms now, but your habits will eventually cause your body to break down." Donella Meadows, Jorgen Randers and Dennis Meadows present such a warning to all of human civilization. They analyze resource consumption, economic distribution, population growth and pollution. Their sobering conclusions amount to an attempt to start humanity on the road to a more equitable, sustainable society. The effort required to read this book comes in part from the writing, which varies drastically in style, tone and

organizational choices, and in part from the innate challenges of the material. That said, getAbstract recommends it to anyone who wishes to plan realistically for the future, whether you’re a CEO who wants to do sustainable business, a national leader who wants to create thriving human institutions, a community member concerned about local pollution, or a parent who does not want his or her children to grow up in a wasteland.

AC says

add Climate Wars...? http://www.thetyee.ca/Books/2009/01/0...
This is an interesting readers site, btw

It's not necessary to read the whole of Meadows -- but a day or two with it -- will suffice. Well worth the time/
