

# Donella Meadows

*In tribute to a departed sustainability pioneer, scientist, prophet, farmer, writer, teacher*

by Leon Kolankiewicz

This past February, one of the guiding lights of the movement for an environmentally sustainable society, nation, and planet was abruptly extinguished. Donella Meadows, 59, died in New Hampshire after a brief but hard-fought struggle with cerebral meningitis.

Dr. Meadows was a scientist, educator, farmer, and syndicated columnist, in addition to filling many other roles that mattered at least as much — daughter, sister, aunt, cousin, friend, and colleague. But to the world at large and to posterity, she will most be remembered and appreciated as an intellectually courageous, indefatigable pioneer on the frontiers of the search and struggle for sustainability. Her vision of a sustainable world was one of a just society in ecological equilibrium with earthly limits, one that avoided the ravages of the “overshoot and crash” catastrophe toward which many environmental scientists believe humanity is hurtling. In this, Meadows was an inspiration to many thousands of sustainability advocates around the world.

Dr. Meadows, known as “Dana” to friends and colleagues, was one of those extraordinary individuals whom historians will credit with having helped found a movement of long-term import. She will be compared to the likes of Aldo Leopold and Rachel Carson. Their seminal works, *A Sand County Almanac* (1949) and *Silent Spring* (1962), are now regarded as classics in the

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conservation and environmental fields. And like Meadows, these two pioneers died before their time. Leopold perished while fighting a brush fire in Wisconsin even before *Almanac* appeared, and Carson succumbed to cancer (which she is said to have suspected was attributable to the very environmental toxins she wrote about) just a year after *Silent Spring* was published.

In Dana’s case, while her book catapulted her to prominence, unlike Leopold and Carson, she had the good fortune to survive the publication of her own landmark

work by nearly three decades and was able to defend, build on, and update its message. In 1972, barely thirty and barely out of graduate school, she was the lead author of *The Limits to Growth* (co-authored with Dennis L. Meadows, Jørgen Randers, and William W. Behrens III), which sold more than nine million copies and was translated into twenty-eight languages. This small book that packed a big wallop was a report for the Club of Rome’s project on “the predicament of mankind” with its interrelated social, economic, and political problems: poverty amidst prosperity, environmental degradation, unchecked urban sprawl, loss of faith in institutions,

alienation of youth, inflation, insecurity of employment, and rejection of traditional values. The club came to call this complex the “world problematique.”

In the summer of 1970, the Club of Rome held meetings and workshops in Bern, Switzerland, and Cambridge, Massachusetts, and began its project on the predicament of mankind. With the financial assistance of the Volkswagen Foundation, the club commissioned Professor Jay Forrester and a team headed by Dennis Meadows (Dana’s then-husband) at the Massachusetts Institute of Technology (MIT) to apply a computer model simulating and integrating specific components of the “problematique.” Originally designed by Forrester, this



Donella Meadows  
1941-2001

Photo by Medora Hebert  
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model incorporated principles from the emerging field of system dynamics and was described in his 1971 book *World Dynamics*.

*The Limits to Growth* concluded that:

*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 one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity.*

This conclusion — that on a round, finite planet there just might be limits to the expansion of “the human enterprise” — is one that should seem at least plausible if not intuitively obvious to anyone with a modicum of scientific or mathematical training.

As Dana Meadows herself commented years later to an interviewer, “From my point of view as a scientist, there was nothing more stupidly obvious than to say that the earth is finite and growth can’t go on forever.” Yet this simple finding caused a furor in 1972, in part because it seemed to be bolstered by the unbiased analysis of a super-smart computer. “COMPUTER PREDICTS WORLD COLLAPSE” screamed one newspaper headline; “A COMPUTER LOOKS AHEAD AND SHUDDERS” cried another. *Limits* provoked a firestorm of criticism, ridicule, and vitriol from the business, economic, political, and even academic establishments, as well as not a little acclaim and applause from a rising number of doubting Thomases who for some years had been growing more and more troubled by ever-increasing human influence over the biosphere.

Now even an objective, complex computer model seemed to be saying that not only would nature succumb to human excess, but that human civilization itself, having overshot the carrying capacity of the environment that supported it, would collapse into a dreadful Malthusian dystopia of prolonged shortages and suffering. And that

this breakdown would occur even *without* a single nuclear bomb exploding. It was scary stuff. For those who believed wholeheartedly in the secular religion of perpetual growth and endless human and technological potential, it was also heretical. Since these particular doomsayers were not kooks in sandals and robes carrying “The End Is Near” signs but scientists and scholars from one of the nation’s most prestigious universities, underwritten by an international club with impressive credentials, the challenge to orthodoxy could not be ignored.

As a college student in the 1970s, majoring in the environmental sciences, I remember clearly how unrealistic the conventional projections of future demand for natural resource commodities seemed to me. Up, up, up they went, with nary a hint that anything could or should ever limit their inexorable ascent. This was true of

timber, paper, metals, other minerals, fish harvest, electricity, oil, coal, gas, uranium, food, water, land for airports, highways and cities, and so forth. It was also true of economic output and “residuals” (or waste generation). Their growth was assumed to be perpetual. Questions like, “How long can this line on this graph continue to go up?” were met with blank stares. Thus, when I discovered *Limits*, it was like a refreshing breeze of truth, logic, and reality dispelling

growthmania’s fumes of delusion. Even as I acknowledged that some of *Limits*’ critics might be at least partially correct — namely that the book underestimated the potential of technology and misconstrued what constitutes resources — for me and many others, *The Limits to Growth* was groundbreaking and brilliant. Its essential truth was unassailable.

Yet *Limits* was assailed. And the ferocity of the assault caught Dana Meadows by surprise: “I was simply astounded at the number and power and loudness of people who wouldn’t accept...” the idea of limits. “They couldn’t allow that book to stand. They threw everything at it they could think of. There’s a deep belief that growth is always good,” she said later.

**Donella H. Meadows** was born March 13, 1941 in Elgin, Illinois. She was educated in the sciences, earning a B.A. in chemistry from Carleton College in 1963 and a Ph.D. in biophysics from Harvard University in 1968. From there she joined MIT as a research fellow under Jay Forrester, the founder of system dynamics as well as the principle of magnetic data storage for computers.

All but lost in the controversy were the cautiously optimistic second and third conclusions of *The Limits to Growth*:

*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 individual human potential.*

*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.*

As Dana herself wrote many years later:

*We didn't think we had written a prediction of doom. We had intended to issue a warning, but also a vision. We saw, with the help of the computer, not one future but many, all possible, some terrible, some terrific.*

This stubborn hope in the face of grim trends was pure Dana. In the clearest indication that the conclusions of *Limits* weren't merely an academic exercise for her, Dana Meadows dedicated the rest of her life to working on behalf of this "sustainable outcome."

The fuss over *Limits* eventually receded and all sides moved on, claiming intellectual victory. (The Earth itself withheld judgment, although numerous adverse environmental trends suggested that the Day of Reckoning was still forthcoming.) In Dana's case, she moved over to Dartmouth College, where she taught environmental systems, ethics, and journalism for the next twenty-nine years. In 1981, she and former husband Dennis Meadows co-founded the International Network of Resource Information Centers (INRIC), also called the Balaton Group, named for the lake in Hungary where INRIC meets. Serving 18 years as its coordinator, Dana led the group's efforts to facilitate valuable exchanges of information between scientists from East and West during the Cold War. These collaborative efforts eventually included hundreds of leaders in the broader sustainability movement, activists and scholars alike.

Dr. Meadows received invitations to teach and lecture throughout the world. She also served on numerous national and international boards and scientific

committees. For example, she served on the board of the Center for a New American Dream, a new non-profit organization focused on consumption issues whose motto is "Less Stuff, More Fun." She received a 1991 Pew Scholarship and a 1994 MacArthur Fellowship (its "genius grant") in support of her work. Although she had earned a Ph.D. more than two decades earlier, in 1992 the Swiss Federal Institute of Technology (ETH)

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presented her with an honorary doctorate in recognition of her achievements. And yet from all accounts, the acclaim did not go to her head. As one admirer wrote, "Genuinely unconcerned with her international fame, she often referred to herself simply as 'a farmer and a writer.'"

While Donella Meadows researched and wrote about global problems, she herself also practiced local solutions, a living personification of Rene Dubos' famous expression, "Think Globally, Act Locally." A eulogy by Alan Atkisson last February at the First Presbyterian Church in Morehead City, North Carolina, mentioned that Dana's worries about climate change made her restrict her own travel. She attended only those events at which she felt her physical presence would do the most good, thus holding down her own contributions to rising carbon dioxide emissions. She also lived for many years on an organic farm, "living simply, saving energy, practicing what she believed must be preached." She bought a hybrid gas/electric car as soon as they became available.

Dana's commitment to the simple things in life is tellingly illustrated in an anecdote by Fran Korten, executive director of the Positive Futures Network:

*My [first] encounter with Dana was at a presentation at Harvard of the model on which The Limits to Growth was based. Dana was the*

*book's primary author, but it was [husband] Dennis who made the presentation. Dana sat in the audience – knitting. I was a young professional woman, struggling in a man's world, and the scene raised the hackles of my budding feminist consciousness.*

*Twenty years later, [we] were visiting Dana at her farm in New Hampshire... We had a lively discussion about the relative contribution of population and consumption to the pressures on the Earth's ecological systems. While we talked, Dana was spinning wool shorn from the lambs on her farm. This time, my hackles were happily quiescent. I had come to deeply appreciate this woman who could not only think about the limits to growth but live her life within them.*

A memorial service to celebrate Dana's life was held on Earth Day, 2001, in Washington, D.C., one of a number around the country and overseas. Colleagues and friends who had known her personally — like ecological economist Herman Daly, Worldwatch Institute founder Lester Brown, and Center for a New American Dream executive director Betsy Taylor — fondly recalled their own memories of Dana, and the down-to-earth wisdom and serenity of this remarkable woman, who embodied both the most profound and practical of considerations. After rejecting religion as foolish early in her scientific career, Dana had undergone a spiritual reawakening, realizing that she was a “frail instrument” and needed to call upon a higher power. She was fond of the divine music of handbell choirs, and one from a nearby church opened the Washington memorial service with a lovely rendition of *Spirit Song* and closed it with *Let All Things Now Living*, a Welsh folk melody.

In 1997, Dr. Meadows founded the Sustainability Institute, which she described as a “think-do-tank.” The Institute combines cutting-edge research on global economic and environmental systems as well as practical demonstrations of sustainable living, including the development of an ecological village and organic farm named Cobb Hill in Hartland Four Corners, Vermont. Cobb Hill is a co-housing community whose residents live in individual solar-powered, energy-efficient homes but engage in common activities like weekend dinners, gardening, yoga classes, volleyball, and child care. The

community includes a dairy farm, maple sugar business, orchards, and organic gardens that supply many local homes and restaurants.

For sixteen years, Dana wrote a weekly syndicated column entitled “The Global Citizen,” which appeared in more than twenty newspapers and was nominated for a Pulitzer Prize in 1991. The *Utne Reader* called it “a weekly installment of fresh thinking about environmental, economic, and social issues ...delightfully eclectic, ranging from provocative assertions that a soaring stock market is not necessarily good news, to thoughtful praise for public libraries, ladybugs, and Pad Thai (as one example of ecofriendly peasant food from around the world that tastes great without a lot of meat or imported ingredients).”

Yet “The Global Citizen” was not a single-minded proponent of One World, open-borders globalization. In April 1998, during a bitter, internecine fight within the Sierra Club over whether that organization should adopt a comprehensive U.S. population stabilization policy that included a commitment both to fertility and immigration reductions, Donella Meadows devoted one of her columns to the sensitive issue. Noting that “there can be virtuous or selfish reasons to be on either side,” Meadows wrote, “I'm bothered by folks who claim noble reasons for their own side and assume the worst of the other side.” She continued, “I'm also bothered by the numbers. I wish the whole debate would go on with more knowledge of and respect for the numbers.”

She then went on to discuss “the numbers.” After enumerating the USA's dwindling old-growth forests, tall-grass prairies, wetlands, aquifers, soils, croplands, and species of wild plants and animals, as well as its growing waste dumps and toxic materials, the column observed: “Any land whose resource stocks are dropping while its pollution sinks are filling is, by definition, being used beyond its carrying capacity. Some number of people at some standard of living in any nation is too many. We don't help either the rich or the poor by going beyond that number.” While Dana did not explicitly weigh in on one side or the other of the Sierra Club debate, the drift of her column was clear: a nation has a right, even an obligation, to keep its population within its carrying capacity.

This column led to my first and only personal conversation with Dana Meadows. As one who had vigorously promoted a comprehensive approach to U.S.

population stabilization, first within the Sierra Club's large Los Angeles Chapter population committee in the early nineties, and later as coordinator for the Carrying Capacity Network (which included many Sierra Club members), I had participated actively in this long-running dispute. I telephoned Dana in New Hampshire to thank her both for addressing the issue in the first place — since many environmentalists shied away from it because of its very touchiness and emotion — and then for her even-handed, “numerate” and “ecolate” (in Garrett Hardin's terms) approach to it. She was gracious in response, and in turn thanked us for our efforts to force the Club and the nation to face up to overpopulation.

On the twentieth anniversary of *The Limits to Growth*, in 1992, Dana and original co-authors Dennis Meadows and Jørgen Randers published *Beyond the Limits*. Plugging updated data into the World3 computer model they had used two decades earlier, the team once again explored the world problematique. Here is what they found:

*...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, [and] the stronger environmental policies, many resource and pollution flows had grown beyond sustainable limits.*

*...We discovered, as we began to talk to colleagues about the world being “beyond the limits,” that they did not really question that conclusion.*

Indeed, some problems, like stratospheric ozone depletion from manmade chemicals, had not even been diagnosed when the original *Limits* was published. The magnitude of other threats, like acid rain, the biodiversity/extinction crisis, and climate change from the accumulation of greenhouse gases, had only been surmised in 1972. By the 1990s there was much stronger evidence of accelerating human overshoot of environmental carrying capacity.

Yet by and large, these unfolding problems, however dire, had not yet begun to forcefully and unmistakably obstruct further human expansion, by means of what systems analysts call “negative feedback.” Indeed, the last three decades have witnessed unprecedented increases in human numbers, resource use, and waste

generation, in tandem with economic growth and rising wealth; overall, the aggregate human economy has more than doubled its physical presence on earth. This success encouraged many skeptics of the limits to growth thesis, the best-known of whom was the late Julian Simon.

Professor Simon argued that not only has human welfare been improving, it promises to do so indefinitely, because human ingenuity, if given the freedom to operate, will always find ways of solving shortages, limits, and problems. Obituaries published after Dr. Meadows' death largely echoed Simon, implying that *The Limits to Growth* had been discredited. Actually, most economists never accepted its conclusions in the first place and most ecologists (and other scientists) never rejected them.

Meanwhile, humanity at large is all but oblivious to the debate, continuing to multiply both in population and consumption, raising its resource “throughput,” exerting ever-greater influence within and strains on the ecosphere. This spring, electrical blackouts began rolling across California, the most populous, wealthiest, and one of the most environmentally aware states in the third-most-populous, wealthiest nation on earth. Of all places, this is precisely where one would have expected and hoped residents and leaders would have been able to finally realize “enough is enough” — yet *no one* in officialdom or the media asked, “But what about generating even more greenhouse gas emissions that will further exacerbate climate change?” as they tripped over themselves to streamline the environmental permitting process and weaken environmental standards in order to bring new power plants on-line ASAP.

In one of her final essays, Dana wrote that, “I've grown impatient with the kind of debate we used to have about whether the optimists or the pessimists are right. Neither are right. There is too much bad news to justify complacency. There is too much good news to justify despair.” Dana had the enviable ability to maintain her inner serenity and her faith in the better angels of human nature, even in the face of the terrifying trends and scenarios she was all too familiar with. In part, her hope stemmed from the fact that, in one sense, we really had no choice *but* to conform with ecological reality.

Asked, “What is your greatest source of hope that society can shift to more responsible patterns of production and consumption and achieve a sustainable future?” she answered:

*The fact that we have to. If we don't choose to,*

*the planet will make us. And the fact that our lives will be better if we do. It isn't sacrifice we're selling, it's a more meaningful, time-filled, love-filled, nature-filled existence. So, as Herman Daly says, we are about to be hit by the hammer of necessity, but we are cradled on the anvil of desirability. We have no choice but to conform.*

Another of Dana's last columns poignantly expressed her deepest concerns and steadfast hopes. Entitled "Polar Bears and Three-Year-Olds on Thin Ice" the February 2, 2001, "Global Citizen" column recounted the dual threats Arctic wildlife faces from pollution and the thinning and shrinking of the Arctic ice cap from global warming:

*Some biologists are saying the polar bear is doomed.*

*A friend of mine, in response to this news, did the only appropriate thing. She burst out weeping. "What am I going to tell my three-year-old?" she sobbed. Any of us still in contact with our hearts and souls should be sobbing with her, especially when we consider that the same toxins that are in the bears are in the three-year-old. And that the three-year-old over her lifetime may witness collapsing ecosystems, north to south, until all creatures are threatened, especially top predators like polar bears and people.*

*Is there any way to end this column other than in gloom? Can I give my friend, you, myself any honest hope that our world will not fall apart? Does our only possible future consist of watching the disappearance of the polar bear, the whale, the tiger, the elephant, the redwood tree, the coral reef, while fearing for the three-year-old?*

*Heck, I don't know. There's only one thing I do know. If we believe that it's effectively over, that we are fatally flawed, that the most greedy and short-sighted among us will always be permitted to rule, that we can never constrain our consumption and destruction, that each of us is too small and helpless to do anything, that we should just give up and enjoy our SUVs*

*while they last, well, then yes, it's over. That's the one way of believing and behaving that gives us a guaranteed outcome.*

*Personally I don't believe that stuff at all. I don't see myself or the people around me as fatally flawed. Everyone I know wants polar bears and three-year-olds in our world. We are not helpless and there is nothing wrong with us except the strange belief that we are helpless and there's something wrong with us. All we need to do, for the bear and ourselves, is to stop letting that belief paralyze our minds, hearts, and souls.*

Dana Meadow's soul — as well as her keen mind and her gentle wisdom — will be sorely missed in the coming years as the struggle for sustainability intensifies, with an uncertain outcome. But her research and writings, as well as her own personal example, helped move thousands of followers and admirers beyond paralysis. •