

# SYSTEM DYNAMICS MEETS THE PRESS

an excerpt from The Global Citizen

by **Donella H. Meadows**

IT WAS 1985. Ronald Reagan had just been elected to a second term. The environment had disappeared as a subject of public discourse; people who lived in poverty were all welfare cheats who refused to get an honest job; the rest of the world was the backyard to which America crowned its perpetual "Morning." I couldn't stand it any more. I resigned my professorship in environmental studies at Dartmouth College to become a newspaper columnist.

I did it with no inside knowledge of the journalistic world. Until then I had met the press only as an object of reporting, and the meetings had been unsettling.

The press knew of me because the media find the field I work in—called system dynamics—fascinating. System dynamics is a set of techniques for thinking and computer modeling that helps its practitioners begin to understand complex systems—systems such as the human body or the national economy or the earth's climate. Systems tools help us keep track of multiple interconnections; they help us see things whole. Because much of conventional wisdom comes from seeing things in parts and focusing on one small part at a time, system dynamicists tend to have surprising points of view. They generate a lot of controversy. Hence the fascination of the press.

In 1969 I watched Jay Forrester (my mentor at MIT, the founder of system dynamics) try to explain to a nation in the midst of urban crisis why cities would be better off if governments pulled down public housing instead of constructing it. As you might expect, that message infuriated city planners. The ensuing ruckus attracted the media like sharks to blood in the water.

By 1970 I was involved with a group at MIT making a system dynamics model of world population growth and economic growth. The press saw it as a global crystal ball, in which to foresee the future of

everything. What an irresistible attraction! *Playboy*, of all publications, was the first to do an article about our work. There it was—an analysis of population growth, economic growth, pollution, resource depletion—right there among the naked ladies. A year or so later, when our book, *The Limits to Growth*, came out, we were given three whole minutes on the "Today" show to explain the growth, overshoot, and collapse of the world economy, just after a mouthwash commercial and just before a demonstration by the British dart-throwing champion. From then on I watched the media misinterpret our book, label it a prophecy of doom, batter it, and discredit it. That was a painful experience, but one that led me to think long and deep about the crucial role of information and information-purveyors in the modern world.

My experiences with the media continued, sometimes funny, sometimes frustrating, occasionally fruitful. I kept coming back to the press because I thought my field provided valuable insights about the world. I wanted those insights to be spread widely—I knew they *must* be spread widely. System dynamics makes clear the overarching power of deep, socially shared ideas about the nature of the world. Out of those ideas arise our systems—government systems, economic systems, technical systems, family systems, environmental systems.

As Ralph Waldo Emerson once said,

*Every nation and every man instantly surround themselves with a material apparatus which exactly corresponds to their state of thought. Observe how every truth and every error, each a thought of some man's mind, clothes itself with societies, houses, cities language, ceremonies, newspapers. Observe... how timber, brick lime and stone have flown into convenient shape, obedient to the master idea reigning in the minds of many persons.... It follows of course that the least change in the man will change his circumstances; the least enlargement of his ideas, the least mitigation of his feelings in respect to other men. If, for example, he could be inspired with a tender kindness to the souls of other men.... every degree of ascendance of this feeling would cause the most striking changes of external things.*

So if we want to bring about the thoroughgoing restructuring of systems that is necessary to solve the world's gravest problems—poverty, pollution, and war—the first step is thinking *differently*. Everybody thinking differently. The whole society thinking differently. There is only one force in the modern world that can cause the entire public to think differently. That force is the mass media.

That was my reasoning when I set out to be a columnist. I was finding the state of the world and the feeble responses of policy makers intolerable. I didn't think that more writing for academics or preaching to the converted would help. I wanted to see a system-based, globally oriented, long-term viewpoint on the editorial pages of the newspapers. I kept waiting around for someone else to write it, but no one did. So I did.

I called the column "The Global Citizen" to emphasize the fact that my readers and I are part of an interconnected world system, whether we want to be or not. After five years of writing "The Global Citizen," I've learned a lot—about perceptions and paradigms, about the media, and about that wonderful public out there to whom we journalists try to speak. This book is a sample of what I've produced. This introduction is a summary of what I've learned.

## THE PRESENT PARADIGM

A paradigm is not only an *assumption* about how things are; it is also a *commitment* to their being that way. There is an emotional investment in a paradigm because it defines one's world and oneself. A paradigm shapes language, thought, and perceptions—and systems. In social interactions, slogans, common sayings, the reigning paradigm of the society is repeated and reinforced over and over, many times a day. Whenever a speaker of an Indo-European language says a sentence, nouns and verbs reinforce the paradigmatic distinction between *things* and *processes* (in some other languages there are only processes). Every time you buy or sell something, you affirm a shared paradigm about the value of money. Every time the president rejoices when the gross national product (GNP) goes up, he strengthens the paradigm of economic growth as an unquestioned good.

Your paradigm is so intrinsic to your mental processes that you are

hardly aware of its existence, until you try to communicate with someone with a different paradigm. Listen to an ecologist talk with an economist, a pro-lifer with a pro-choicer, a right-winger with a left-winger. In the difficulties of cross-paradigm discussion, both parties begin to be aware, often uncomfortably, of unspoken, fundamental assumptions they do not share. System dynamicists were raised in the general culture, of course, long before they learned about system dynamics, so they are not uncomfortable in the normal paradigm of everyday life. But their systems training makes them very aware of the many unsystematic assumptions that permeate societal talk, political thinking, and daily news reports. Here are a few of the common assumptions of the current social paradigm that seem to me to be clearly unsystematic and problematic. These are the assumptions that disturbed me enough to want to write a newspaper column:

- One cause produces one effect. There must be a single cause, for example, of acid rain, or cancer, or the greenhouse effect. All we need to do is discover and remove it.
- All growth is good—and possible. There are no effective limits to growth.
- There is an "away" to throw things to. When you have thrown something "away," it is gone.
- Technology can solve any problem that comes up. There is no cost to technology, no delay in attaining it, no confusion about what kind of technology is needed. Improvements will come through better technology, not better humanity.
- The future is to be predicted, not chosen or created. It happens to us; we do not shape it.
- A problem does not exist or is not serious until it can be measured.
- If something is "economic," it needs no further justification. E. F. Schumacher, writes, "Call a thing immoral or ugly, soul-destroying or a degradation of man, a peril to the peace of the world or to the well-being of future generations; as long as you have not shown it to be 'uneconomic,' you have not really questioned its right to exist, grow, and prosper."
- Relationships are linear, nondelayed, and continuous; there are no critical thresholds; feedback is accurate and timely; systems are manageable through simple cause-effect thinking.

- Results can be measured by effort expended—if you have spent more for weapons, you have more security; if you use more electricity, you are better off; if you spend more for schools, your children will be better educated.
- Nations are disconnected from one another, people are disconnected from nature, economic sectors can be developed independently from one another, some parts of a system can thrive while other parts suffer.
- Choices are either/or, not both/and.
- Possession of *things* is the source of happiness.
- Individuals cannot make any difference.
- People are basically bad, greedy, and not to be trusted. Good people and good actions are rare exceptions.
- The rational powers of human beings are superior to their intuitive powers or their moral powers.
- Present systems are tolerable and will not get much worse; alternative systems cannot help but be worse than the ones we've got.
- We know what we are doing.

I submit that the above statements are partially or wholly false, that they are implicit or explicit in virtually all public discourse, that they give rise to much of the counterproductive behavior of individuals and institutions, and that the harm done by them is incalculable. The only way I know to throw them into question is to question them, over and over, with as much documentation, clarity, and persuasiveness as possible, in the most visible public forums.

### **EVEN THE SIMPLEST SYSTEMS CONCEPTS HELP**

The level of public discussion is so simpleminded that it doesn't take much to raise its quality. The most fundamental tenets of system dynamics can clear up significant muddles in public thinking. Take, for example, the distinction between a stock and a flow—the distinction between the amount of water already in a bathtub and the amount pouring in through the faucet. I once wrote a whole column on the difference between the national deficit (a flow—the water pouring in—the rate at which we borrow) and the national debt (a stock—the water already in the bathtub—the

accumulated debt). Reducing the deficit, I pointed out, will not reduce the level of debt; it will only mean that things are getting worse at a somewhat slower rate.

This is trivial systems theory, but I'm still not sure our politicians understand it.

It is a revelation to most people that you can increase the contents of a stock by reducing outflow as well as by increasing inflow, that, for example, economic wealth can be enhanced by repairing and maintaining old equipment as well as by investing in new equipment.

The effect of nonlinear relationships is not generally understood. For example, the public debate on the seriousness of soil erosion has yet to recognize that the relationship between soil depth and crop yield can be sharply nonlinear—that a little erosion may not have much effect, but a little more erosion may reduce output dramatically.

Other systems ideas that have immediate public relevance are:

- *Simple interconnectedness.* For example, energy conservation would not only save consumers money; it would also cut urban air pollution, acid rain, greenhouse gases, the production of radioactive wastes, the trade deficit, and defense costs in the Persian Gulf—only a few of the effects that would radiate through economic and environmental systems.
- *The astounding power of positive feedback and exponential growth.* Nigeria's population grew over the past thirty-five years from 43 million to 105 million. At the same rate of change over the next thirty-five years, Nigeria is expected to add another 207 million people, for a total of 312 million—43 million to 312 million over one human lifetime!
- *The time it takes for huge stocks to change.* After five years of *perestroika* the Soviet Union's economic situation has changed little. People are calling it a failure, not understanding how long it takes for a nation's capital plant, exhausted soils, and disaffected workforce to be revitalized.
- *The effect of delays on feedback.* Why oil prices went up and back down and why they will go up again.
- *The much greater importance of internal system structure than of triggering events.* One of the most controversial columns I ever wrote tried to divert attention from the immediate faults of Morton Thiokol's O-rings to the underlying structure that made a space shuttle accident almost

inevitable.

- *The effect of bias in information streams.* Consistent Soviet and American overestimates of each other's weapons capability have been a major driving force in the positive feedback loop of the arms race.
- *The difference between information and physical quantities in systems.* I could write a column every week about the endless confusions between money and the real things money stands for.
- *How rational microbehavior can lead to disastrous macroresults.* The tragedy of the commons, the rise in malpractice insurance, economic cycles—there are hundreds of examples of this phenomenon. It is one of the most powerful concepts we have to offer because it *turns public discussion from the problem of blame to the problem of restructuring.*

Just one of these ideas at a time is enough to communicate in a newspaper column of 800 words. But they are ideas that can be communicated. Any systems concept, even a quite sophisticated one, can be expressed in words, in just a few paragraphs, as I hope the columns in this book demonstrate.

It's not easy to take on a social paradigm, and it's not welcome. When I started out, most newspaper editors did not think the environment belonged on the editorial page, much less anything directly attacking the most cherished beliefs of the society. I still have trouble getting editors to accept truly new ideas, especially ideas that attack the market system. My economic columns are the most unpopular ones I write, not with readers, but with editors. Many papers simply refuse to print them. You can't challenge the prevailing paradigm too directly.

But you can challenge it indirectly, bit by bit, again and again, presenting more and more evidence. Thomas Kuhn, who wrote *The Structure of Scientific Revolutions*, the seminal book about paradigms, says that what ultimately causes a paradigm to change is the accumulation of anomalies—observations that do not fit into and cannot be explained by the prevailing paradigm. The anomalies have to be presented over and over because there is a social determination not to see them.

Challenging a paradigm is not part-time work. It is not sufficient to make your point once and then blame the world for not getting it. The world has a vested interest in, a commitment to, not getting it. The point

has to be made patiently and repeatedly, day after day after day. Fortunately, there are media like newspapers and television that have space to be filled day after day after day.

## THE FILTERS

I have come to know at least fifty newspaper editors. They are well-informed people. They read four or five newspapers a day; editorial page editors read at least twenty opinion columns a day. They are disciplined, productive, and nimble with words. They make their deadlines every single day. Most of them follow a set of strong professional ethics about evidence, balance, truthfulness, and the public's right to know. Above all, they *care* about society and democracy and the information streams that hold a community or a nation together.

Like everyone else, however, they are embedded in a system whose structure, rewards, and punishments inevitably shape their behavior, not always for the good. The enterprises they work for put out a daily product on a rigid schedule that is not conducive to careful reflection. They are commercial enterprises that have to attract advertisers, appeal to the public taste, and make a profit. There is only so much space available every day, and competition for that space is intense.

Everything I've said about newspapers is even more true of the broadcast media. The result is a set of characteristics we are all familiar with—the standard and generally accurate set of criticisms about the media.

- They are event-oriented; they report only the surface of things, not the underlying structures.
- Their attention span is short, they create fads and drop them, they don't see slow, long-term phenomena (they ignored the greenhouse effect for decades until there was drought in the Midwest).
- They follow a herd instinct; they will send 1,500 reporters to one political convention, but no reporters will be on hand when crucial environmental policy is being made.
- They are attracted to personalities and authorities; they are uninterested in people they've never heard of.

- To meet time and space constraints, they simplify issues; they have little tolerance for uncertainty, ambiguity, tradeoffs, or complexity.
- They operate from skepticism; they have been lied to and manipulated so often that they don't believe anyone; they carry such a load of cynicism that they often unnerve sincere people who are telling the truth.
- They have a tendency to force the world to conform to their story rather than see the world as it is. (I have several times had the frustrating experience of being interviewed by a reporter who didn't want to hear facts that contradicted "the story.")
- They love controversy and think harmony is boring; they see the world as a set of win/lose, right/wrong situations; they are attracted to conflict and to things that aren't working; they do not pay attention to things that are working.
- They are strongly conservative; though they like to think of themselves as tough and uncompromising, in fact they challenge society only at its margins; most of the time, usually unconsciously, they reinforce the status quo and resist really new ideas.
- Also unconsciously they report through filters of helplessness, hopelessness, cynicism, passivity, and acceptance. They report problems, not solutions, obstacles, not opportunities. They systematically unempower themselves and their audience.

Why should anyone try to communicate messages of complexity, of structure, of long-term thinking, of inclusiveness, of empowerment through a system like this one? Because if we want a better world, we have no choice. And because it can be done, in spite of that negative list I've just made. I've learned that communicating through the media is harder than I thought, but also more possible and rewarding than I thought.

## **IT CAN BE DONE**

My greatest help has been a handful of editors and television producers who have taken me in hand, coached me, and criticized me. Slowly they have taught me to stop resisting the strictures of the media and to work within them, without, I hope, losing my purpose or message.

My greatest problem at the beginning was keeping my columns

under 800 words (the earliest columns in this collection are the longest ones). One of my editors thundered at me, "George Will can write less than 800 words. Mary McGrory can write less than 800 words. Why can't you write less than 800 words?" Another reminded me that I didn't have to say everything all at once. With a weekly column, I'd always have another chance.

Be clear, not fancy, they told me. Use everyday language. Be specific, not abstract. Offer easily imaginable examples. Be sure your words make pictures in people's heads. Be sure the pictures are the ones you intend.

Use most of your column for the evidence, they said. Tell stories give statistics, show the impact of the problem or the solution on the real world. People can form their own conclusions if you give them the evidence. Don't take much space for grand, abstract conclusions; let the reader form the conclusions.

Use a hook to the news—that point was hard for an academic like me to get. If you're writing about energy conservation, tie it to the shooting down of a commercial airliner over the Persian Gulf. If you're writing about the ozone hole, point out that the Senate just ratified a treaty to combat it. People have to know that what they're about to read is important. They think the daily news is important. So use that hook, even if you're not going to talk about the daily news.

Write an interesting lead. Another editor once blasted me with "That was the most terrific column you ever wrote, but it had a boring, killer lead." A killer lead is an opening sentence that makes the reader yawn and turn to the sports page.

Never write in an apologetic tone, they told me, or a defensive one. Never, ever, ever, condescend to the reader. Never present a problem without providing at least a hint of what to do about it. Don't get people all riled up and then drop them into helplessness.

A television producer taught me an important lesson—whatever your story, tell it through *people*. Human beings are much more interested in other human beings than in ideas. Don't shy away from personalities, don't try to hide your own personality (difficult for a scientist who has been trained otherwise). If you care about something, let your care show as well as your evidence. If you're writing about someone else who cares, or who doesn't, make that person as real and whole on paper as you possibly can.

Be humble. You don't know everything. Even system dynamicists don't know everything. In fact no human being knows much of anything, compared with the immense wonders and uncertainties of the universe. So keep a sense of perspective. Say what you can say and no more; say it with the appropriate degree of certainty and no more. That is a hard lesson to follow. It's a torture every day and a duty, a discipline and a Zen Koran, the bane of my existence and the best challenge of my life.

You can decide for yourself, reading the columns collected here, how well I have learned these lessons. You will also note a few lessons I have imposed upon myself. Though I often despair about the state of the world, I also tell good-news stories. That's uncharacteristic for a columnist, but necessary for a reformer who wants to show that a better world is both imaginable and feasible. I often show up personally in my columns, a practice much frowned upon in the profession, but one that makes me feel more honest. I don't think columns should sound like they come from God. I like to be reminded that authors are always limited, biased, quirky human beings.

## **SO WHY A BOOK?**

Because my readers kept asking me for one. Because Island Press came along with the suggestion that I do it. Because the issues I write about do not go away with the speed of the fast-fading contents of the daily newspaper. And because, as I discovered as I waded into five years of accumulated columns, my little squibs stand together perhaps better than they stood apart.

Though I was taking on energy one week and the greenhouse effect the next and the absence of political leadership the week after that, in fact those three topics ht together in a way that a single 800-word column couldn't express. Whatever the weekly topic, my columns have all flowed from a systems-trained mind that does its best to operate with a holistic picture of how things are integrated. It was fun to put the pieces back together again.

## **THE REWARDS**

As my columns appear in more papers and reach more people, I hear from some of those people, and that is the gratifying part of this exercise. I get letters and phone calls, sometimes angry, sometimes crazy, but mostly thoughtful, appreciative, supportive, and interesting.

People send me additional material about a subject I've written about. They tell me about steps they are taking to correct a problem. They point out my mistakes, usually very patiently. They ask questions and suggest column ideas. They let me know when they think one of my columns is below standard, and they're always right. They tell me they've cut out one of my pieces and sent it to their senator or brother-in-law, or they've read it to their ninth-grade class, or they've stuck it up on their bulletin board at work.

There's a great audience of engaged, active global citizens out there, yearning to make sense of their world and to make that world better. They put ideas to work. They are the living receptacles, perpetuators, and changers of the paradigms of society. They—you—are the key to a sufficient, sustainable, fair, and wonderful future.

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