



MAY 1998

Home
Current Issue
Archive
Forum
Site Guide
Feedback
Subscribe
Search

Browse >>
Books & Critics
Fiction
Food
Foreign Affairs
Language
Poetry Pages
Politics & Society
Science & Technology
Travel & Pursuits

Send this page to a friend

[Return to the Table of Contents.](#)

The online version of this article appears in three parts. [Click here to go to part one.](#) [Click here to go to part two.](#)

BUT we don't need worst-case scenarios: best-case scenarios make the point. The population of the earth is going to nearly double one more time. That will bring it to a level that even the reliable old earth we were born on would be hard-pressed to support. Just at the moment when we need everything to be working as smoothly as possible, we find ourselves inhabiting a new planet, whose carrying capacity we cannot conceivably estimate. We have no idea how much wheat this planet can grow. We don't know what its politics will be like: not if there are going to be heat waves like the one that killed more than 700 Chicagoans in 1995; not if rising sea levels and other effects of climate change create tens of millions of environmental refugees; not if a 1.5 degree jump in India's temperature could reduce the country's wheat crop by 10 percent or divert its monsoons.



The arguments put forth by cornucopians like Julian Simon -- that

human intelligence will get us out of any scrape, that human beings are "the ultimate resource," that Malthusian models "simply do not comprehend key elements of people" -- all rest on the same premise: that human beings change the world mainly for the better.

If we live at a special time, the single most special thing about it may be that we are now apparently degrading the most basic functions of the planet. It's not that we've never altered our surroundings before. Like the beavers at work in my back yard, we have rearranged things wherever we've lived. We've leveled the spots where we built our homes, cleared forests for our fields, often fouled nearby waters with our waste. That's just life. But this is different. In the past ten or twenty or thirty years our impact has grown so much that we're changing even those places we don't inhabit -- changing the way the weather works, changing the plants and animals that live at the poles or deep in the jungle. This is total. Of all the remarkable and unexpected things we've ever done as a species, this may be the biggest. Our new storms and new oceans and new glaciers and new springtimes -- these are the eighth and ninth and tenth and eleventh wonders of the modern world, and we have lots more where those came from.

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Go to part one of this article.

Go to part two of this article.

We have gotten very large and very powerful, and for the foreseeable future we're stuck with the results. The glaciers won't grow back again anytime soon; the oceans won't drop. We've already done deep and systemic damage. To use a human analogy, we've already said the angry and unforgivable words that will haunt our marriage till its end. And yet we can't simply walk out the door. There's no place to go. We have to salvage what we can of our relationship with the earth, to keep things from getting any worse than they have to be.

If we can bring our various emissions quickly and sharply under control, we *can* limit the damage, reduce dramatically the chance of horrible surprises, preserve more of the biology we were born into. But do not underestimate the task. The UN's Intergovernmental Panel on Climate Change projects that an immediate 60 percent reduction in fossil-fuel use is necessary just to stabilize climate at the current level of disruption. Nature may still meet us halfway, but halfway is a long way from where we are now. What's more, we can't delay. If we wait a few decades to get started, we may as well not even begin. It's not like poverty, a concern that's always there for civilizations to address. This is a timed test, like the SAT: two or three decades, and we lay our pencils down. It's *the* test for our generations, and population is a part of the answer.

Changing "Unchangeable" Needs

WHEN we think about overpopulation, we usually think first of the developing world, because that's where 90 percent of new human beings will be added during this final doubling. In *The Population Bomb*, Paul Ehrlich wrote that he hadn't understood the issue emotionally until he traveled to New Delhi, where he climbed into an ancient taxi, which was hopping with fleas, for the trip to his hotel. "As we crawled through the city, we entered a crowded slum area.... the streets seemed alive with people. People eating, people washing, people sleeping. People visiting, arguing, and screaming.... People, people, people, people."

We fool ourselves when we think of Third World population growth as producing an imbalance, as Amartya Sen points out. The white world simply went through its population boom a century earlier (when Dickens was writing similar descriptions of London). If UN calculations are correct and Asians and Africans will make up just under 80 percent of humanity by 2050, they will simply have returned, in Sen's words, "to being proportionately almost exactly as numerous as they were before the European industrial revolution."

And of course Asians and Africans, and Latin Americans, are much "smaller" human beings: the balloons that float above their heads are tiny in comparison with

ours. Everyone has heard the statistics time and again, usually as part of an attempt to induce guilt. But hear them one more time, with an open mind, and try to think strategically about how we will stave off the dangers to this planet. Pretend it's not a moral problem, just a mathematical one.

- An American uses seventy times as much energy as a Bangladeshi, fifty times as much as a Malagasi, twenty times as much as a Costa Rican.
- Since we live longer, the effect of each of us is further multiplied. In a year an American uses 300 times as much energy as a Malian; over a lifetime he will use 500 times as much.
- Even if all such effects as the clearing of forests and the burning of grasslands are factored in and attributed to poor people, those who live in the poor world are typically responsible for the annual release of a tenth of a ton of carbon each, whereas the average is 3.5 tons for residents of the "consumer" nations of Western Europe, North America, and Japan. The richest tenth of Americans -- the people most likely to be reading this magazine -- annually emit eleven tons of carbon apiece.
- During the next decade India and China will each add to the planet about ten times as many people as the United States will -- but the stress on the

natural world caused by new Americans may exceed that from new Indians and Chinese combined. The 57.5 million Northerners added to our population during this decade will add more greenhouse gases to the atmosphere than the roughly 900 million added Southerners.

From the archives:

• **"Our Real China Problem," by Mark Hertsgaard (November, 1997)**

The price of China's surging economy is a vast degradation of the environment, with planetary implications. Although the Chinese government knows the environment needs protection, writes the author, who spent six weeks inside China investigating the growing environmental crisis, it fears

These statistics are not eternal. Though inequality between North and South has steadily increased, the economies of the poor nations are now growing faster than those of the West. Sometime early in the next century China will pass the United States as the nation releasing the most carbon dioxide into the atmosphere, though of course it will be nowhere near the West on a per capita basis.

For the moment, then (and it is the moment that counts), we can call the United States the most populous nation on earth, and the one with the highest rate of growth. Though the U.S. population increases by only about three million people a year, through births and immigration together, each of those three million new Americans will consume on average forty or fifty times as much as a person born in the Third World. My daughter, four at this writing, has already used more stuff and added more waste to the environment than most of the world's residents do in a lifetime. In my thirty-seven years I have probably outdone small Indian villages.

Population growth in Rwanda, in Sudan, in

that doing the right thing could be political suicide.

El Salvador, in the slums of Lagos, in the highland hamlets of Chile, can devastate *those places*. Growing too fast may mean that they run short of cropland to feed themselves, of firewood to cook their food, of school desks and hospital beds. But population growth in those places doesn't devastate *the planet*. In contrast, we easily absorb the modest annual increases in our population. America seems only a little more crowded with each passing decade in terms of our daily lives. You can still find a parking spot. But the earth simply can't absorb what we are adding to its air and water.

SO if it is we in the rich world, at least as much as they in the poor world, who need to bring this alteration of the earth under control, the question becomes how. Many people who are sure that controlling population is the answer overseas are equally sure that the answer is different here. If those people are politicians and engineers, they're probably in favor of our living more efficiently -- of designing new cars that go much farther on a gallon of gas, or that don't use gas at all. If they're vegetarians, they probably support living more simply -- riding bikes or buses instead of driving cars.

Both groups are utterly correct. I've spent much of my career writing about the need for cleverer technologies and humbler aspirations. Environmental damage can be

expressed as the product of Population x Affluence x Technology. Surely the easiest solution would be to live more simply and more efficiently, and not worry too much about the number of people.

But I've come to believe that those changes in technology and in lifestyle are not going to occur easily and speedily. They'll be begun but not finished in the few decades that really matter. Remember that the pollution we're talking about is not precisely pollution but rather the inevitable result when things go the way we think they should: new filters on exhaust pipes won't do anything about that CO₂. We're stuck with making real changes in how we live. We're stuck with dramatically reducing the amount of fossil fuel we use. And since modern Westerners are practically machines for burning fossil fuel, since virtually everything we do involves burning coal and gas and oil, since we're wedded to petroleum, it's going to be a messy breakup.

So we need to show, before returning again to population, why simplicity and efficiency will not by themselves save the day. Maybe the best place to start is with President Bill Clinton -- in particular his reaction to global warming. Clinton is an exquisite scientific instrument, a man whose career is built on his unparalleled ability to sense minute changes in public opinion. He understands our predicament. Speaking to the United Nations early last summer, he said plainly, "We humans are changing the global

climate.... No nation can escape this danger. None can evade its responsibility to confront it, and we must all do our part."

But when it comes time to do our part, we don't. After all, Clinton warned of the dangers of climate change in 1993, on his first Earth Day in office. In fact, he solemnly promised to make sure that America produced no more greenhouse gases in 2000 than it had in 1990. But he didn't keep his word. The United States will spew an amazing 15 percent more carbon dioxide in 2000 than it did in 1990. It's as if we had promised the Russians that we would freeze our nuclear program and instead built a few thousand more warheads. We broke our word on what history may see as the most important international commitment of the 1990s.

From the archives:

- **"Reinventing the Wheels," by Amory B. Lovins and L. Hunter Lovins (January, 1995)**

New ways to design, manufacture, and sell cars can make them ten times more fuel-efficient, and at the same time safer, sportier, more beautiful

What's important to understand is why we broke our word. We did so because Clinton understood that if we were to keep it, we would need to raise the price of fossil fuel. If gasoline cost \$2.50 a gallon, we'd drive smaller cars, we'd drive electric cars, we'd take buses -- and we'd elect a new President. We can hardly blame Clinton, or any other politician. His real goal has been to speed the pace of economic growth, which has been the key to his popularity. If all the world's leaders could be gathered in a single room, the one thing that every last



and comfortable,
far more durable,
and probably
cheaper. Here
comes the
biggest change
in industrial
structure since
the microchip.

socialist,
Republican, Tory, monarchist, and trade
unionist could agree on would be the truth
of Clinton's original campaign admonition:
"It's the economy, stupid."

The U.S. State Department had to send a
report to the United Nations explaining why
we would not be able to keep our Earth Day
promise to reduce greenhouse-gas
emissions; the first two reasons cited were
"lower-than-expected fuel prices" and
"strong economic growth." The former
senator Tim Wirth, who until recently was
the undersecretary of state for global affairs,
put it nakedly: the United States was
missing its emissions targets because of
"more prolonged economic activity than
expected."

America's unease with real reductions in
fossil-fuel use was clear at last year's
mammoth global-warming summit in
Kyoto. With utility executives and
Republican congressmen stalking the halls,
the U.S. delegation headed off every
attempt by other nations to strengthen the
accord. And even the tepid treaty produced
in Kyoto will meet vigorous resistance if it
ever gets sent to the Senate.

Changing the ways in which we live has to
be a fundamental part of dealing with the
new environmental crises, if only because it
is impossible to imagine a world of 10
billion people consuming at our level. But
as we calculate what must happen over the

next few decades to stanch the flow of CO₂, we shouldn't expect that a conversion to simpler ways of life will by itself do the trick. One would think offhand that compared with changing the number of children we bear, changing consumption patterns would be a breeze. Fertility, after all, seems biological -- hard-wired into us in deep Darwinian ways. But I would guess that it is easier to change fertility than lifestyle.

From the archives:

- **"The Age of Social Transformation,"**
by Peter F. Drucker
(November, 1994)

A survey of the epoch that began early in this century, and an analysis of its latest manifestations: an economic order in which knowledge, not labor or raw material or capital, is the key resource.

PERHAPS our salvation lies in the other part of the equation -- in the new technologies and efficiencies that could make even our wasteful lives benign, and table the issue of our population. We are, for instance, converting our economy from its old industrial base to a new model based on service and information. Surely that should save some energy, should reduce the clouds of carbon dioxide. Writing software seems no more likely to damage the atmosphere than writing poetry.

Forget for a moment the hardware requirements of that new economy -- for instance, the production of a six-inch silicon wafer may require nearly 3,000 gallons of water. But do keep in mind that a hospital or an insurance company or a basketball team requires a substantial physical base. Even the highest-tech office is built with steel and cement, pipes and wires. People working in services will buy all sorts of things -- more software, sure, but also more

sport utility vehicles. As the Department of Energy economist Arthur Rypinski says, "The information age has arrived, but even so people still get hot in the summer and cold in the winter. And even in the information age it tends to get dark at night."

Yes, when it gets dark, you could turn on a compact fluorescent bulb, saving three fourths of the energy of a regular incandescent. Indeed, the average American household, pushed and prodded by utilities and environmentalists, has installed one compact fluorescent bulb in recent years; unfortunately, over the same period it has also added seven regular bulbs. Millions of halogen torchère lamps have been sold in recent years, mainly because they cost \$15.99 at K-mart. They also suck up electricity: those halogen lamps alone have wiped out all the gains achieved by compact fluorescent bulbs. Since 1983 our energy use per capita has been increasing by almost one percent annually, despite all the technological advances of those years.

As with our homes, so with our industries. Mobil Oil regularly buys ads in leading newspapers to tell "its side" of the environmental story. As the company pointed out recently, from 1979 to 1993 "energy consumption per unit of gross domestic product" dropped 19 percent across the Western nations. This sounds good -- it's better than one percent a year. But of course the GDP grew more than two

percent annually. So total energy use, and total clouds of CO₂, continued to increase.

It's not just that we use more energy. There are also more of us all the time, even in the United States. If the population is growing by about one percent a year, then we have to keep increasing our technological efficiency by that much each year -- and hold steady our standard of living -- just to run in place. The President's Council on Sustainable Development, in a little-read report issued in the winter of 1996, concluded that "efficiency in the use of all resources would have to increase by more than fifty percent over the next four or five decades just to keep pace with population growth." Three million new Americans annually means many more cars, houses, refrigerators. Even if everyone consumes only what he consumed the year before, each year's tally of births and immigrants will swell American consumption by one percent.

We demand that engineers and scientists swim against that tide. And the tide will turn into a wave if the rest of the world tries to live as we do. It's true that the average resident of Shanghai or Bombay will not consume as lavishly as the typical San Diegan or Bostonian anytime soon, but he will make big gains, pumping that much more carbon dioxide into the atmosphere and requiring that we cut our own production even more sharply if we are to stabilize the world's climate.

The United Nations issued its omnibus report on sustainable development in 1987. An international panel chaired by Gro Harlem Brundtland, the Prime Minister of Norway, concluded that the economies of the developing countries needed to grow five to ten times as large as they were, in order to meet the needs of the poor world. And that growth won't be mainly in software. As Arthur Rypinski points out, "Where the economy is growing really rapidly, energy use is too." In Thailand, in Tijuana, in Taiwan, every 10 percent increase in economic output requires 10 percent more fuel. "In the Far East," Rypinski says, "the transition is from walking and bullocks to cars. People start out with electric lights and move on to lots of other stuff. Refrigerators are one of those things that are really popular everywhere. Practically no one, with the possible exception of people in the high Arctic, doesn't want a refrigerator. As people get wealthier, they tend to like space heating and cooling, depending on the climate."

In other words, in doing the math about how we're going to get out of this fix, we'd better factor in some unstoppable momentum from people on the rest of the planet who want the very basics of what we call a decent life. Even if we airlift solar collectors into China and India, as we should, those nations will still burn more and more coal and oil. "What you can do with energy conservation in those situations is sort of at the margin,"

Rypinski says. "They're not interested in fifteen-thousand-dollar clean cars versus five-thousand-dollar dirty cars. It was hard enough to get Americans to invest in efficiency; there's no feasible amount of largesse we can provide to the rest of the world to bring it about."

The numbers are so daunting that they're almost unimaginable. Say, just for argument's sake, that we decided to cut world fossil-fuel use by 60 percent -- the amount that the UN panel says would stabilize world climate. And then say that we shared the remaining fossil fuel equally. Each human being would get to produce 1.69 metric tons of carbon dioxide annually -- which would allow you to drive an average American car nine miles a day. By the time the population increased to 8.5 billion, in about 2025, you'd be down to six miles a day. If you carpoled, you'd have about three pounds of CO₂ left in your daily ration -- enough to run a highly efficient refrigerator. Forget your computer, your TV, your stereo, your stove, your dishwasher, your water heater, your microwave, your water pump, your clock. Forget your light bulbs, compact fluorescent or not.

I'm not trying to say that conservation, efficiency, and new technology won't help. They will -- but the help will be slow and expensive. The tremendous momentum of growth will work against it. Say that someone invented a new furnace tomorrow

that used half as much oil as old furnaces. How many years would it be before a substantial number of American homes had the new device? And what if it cost more? And if oil stays cheaper per gallon than bottled water? Changing basic fuels -- to hydrogen, say -- would be even more expensive. It's not like running out of white wine and switching to red. Yes, we'll get new technologies. One day last fall *The New York Times* ran a special section on energy, featuring many up-and-coming improvements: solar shingles, basement fuel cells. But the same day, on the front page, William K. Stevens reported that international negotiators had all but given up on preventing a doubling of the atmospheric concentration of CO₂. The momentum of growth was so great, the negotiators said, that making the changes required to slow global warming significantly would be like "trying to turn a supertanker in a sea of syrup."

There are no silver bullets to take care of a problem like this. Electric cars won't by themselves save us, though they would help. We simply won't live efficiently enough soon enough to solve the problem. Vegetarianism won't cure our ills, though it would help. We simply won't live simply enough soon enough to solve the problem.

Reducing the birth rate won't end all our troubles either. That, too, is no silver bullet. But it would help. There's no more practical decision than how many children to have.

(And no more mystical decision, either.)

The bottom-line argument goes like this: The next fifty years are a special time. They will decide how strong and healthy the planet will be for centuries to come. Between now and 2050 we'll see the zenith, or very nearly, of human population. With luck we'll never see any greater production of carbon dioxide or toxic chemicals. We'll never see more species extinction or soil erosion. Greenpeace recently announced a campaign to phase out fossil fuels entirely by mid-century, which sounds utterly quixotic but could -- if everything went just right -- happen.

So it's the task of those of us alive right now to deal with this special phase, to squeeze us through these next fifty years. That's not fair -- any more than it was fair that earlier generations had to deal with the Second World War or the Civil War or the Revolution or the Depression or slavery. It's just reality. We need in these fifty years to be working simultaneously on all parts of the equation -- on our ways of life, on our technologies, and on our population.

As Gregg Easterbrook pointed out in his book *A Moment on the Earth* (1995), if the planet does manage to reduce its fertility, "the period in which human numbers threaten the biosphere on a general scale will turn out to have been much, much more brief" than periods of natural threats like the Ice Ages. True enough. But the period in

question happens to be our time. That's what makes this moment special, and what makes this moment hard.

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Bill McKibben is the author of several books about the environment, including *The End of Nature* (1989) and *Hope, Human and Wild* (1995). His article in this issue will appear in somewhat different form in his book *Maybe One: A Personal and Environmental Argument for Single-Child Families*, to be published this month by Simon & Schuster.

Illustrations by Brian Cronin

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The Atlantic Monthly; May 1998; A Special Moment in History; Volume 281, No. 5; pages 55 - 78.

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