



EYES WIDE OPEN

Going **Behind** the Environmental Headlines



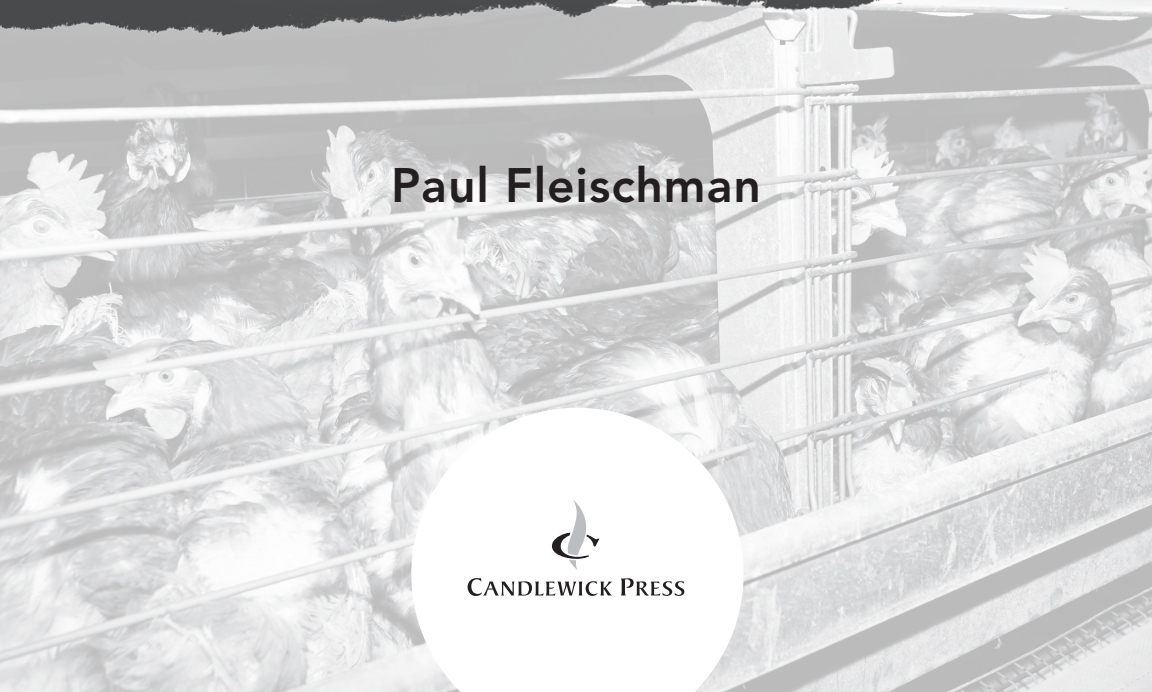
Paul Fleischman



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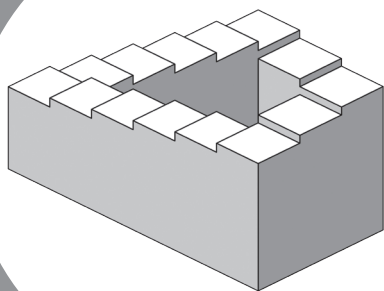
Going Behind the Environmental Headlines

Paul Fleischman



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optical illusions

Seeing
what's
really
going on

E

verybody lives inside his or her own movie. Mine had usually seemed a light comedy. Then I noticed the first dead bee on the driveway. Then three or four every week. Then the weeks became months. The soundtrack turned ominous. What was this — Stephen King?

When I was a kid, we used to cut out articles about strange goings-on and bring them proudly to school. These were “current events.” Interesting fact: they only happened to other people.

The same with history. Every June we turned in our history textbooks even though our teachers might only have reached the Model T Ford. Who won World War I? Have a nice summer! History was the dusty past, unconnected to us.

Staring at the bees, I knew otherwise. History is happening right here and right now, whether you live in New York City or, like me, in little Aromas, California, a town too small to merit a traffic light.

What was up with the bees? I wondered. And the environment in



Santa Cruz (CA) Sentinel, 7-13-12

**Gas land?
Community roused
as seismic study
seeks oil near
Aromas**

general. What obstacles are we facing? What solutions have we come up with?

The great thing about history happening right now is that it's all around you. That's also the not-so-great thing. There are plenty of facts, but we're so close to them that it's hard to know what they mean or which ones are important.

*The **planning fallacy**, for example, which causes us to underestimate how long it will take to do something.*

*Or **normalcy bias**, the tendency not to take seriously a disaster that's never happened to us before. I fell into the first in writing this book about the second.*

This is especially true today. Adolescence is dramatic and untidy; so are periods when societies change. In times like these, the street-level scene can feel too confusing to comprehend. But in the course of trying to answer those questions, I found some ways to get altitude. Each of the chapters after this introductory section offers a different lens to peer through. Suddenly, we can make out patterns and principles that are driving the headlines. Having names for them will grant you power. You'll begin noticing the same things going on elsewhere — in advertising, politics, and the whole culture we're part of.

It all starts with seeing, and seeing through the everyday world's two biggest illusions.

It's always been this way.

Air-conditioning. Phone calls bouncing off satellites. Clothes dryers and gas lawn mowers. Driving to school and flying cross-country. They're all so common that we hardly notice them, but they're barely older than your baby brother. Over the past two hundred

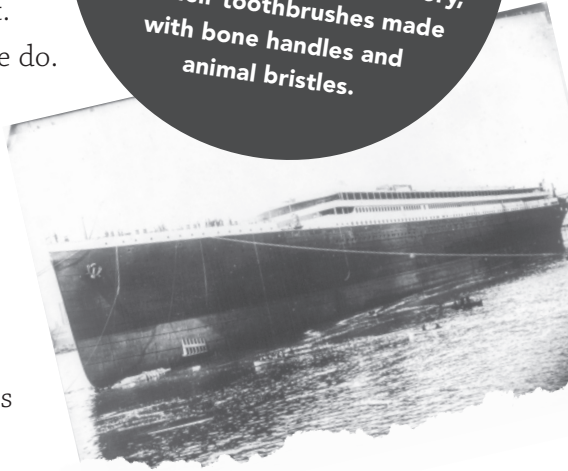
years we found out what coal, then oil, then natural gas, then the atom could do for us, making leaps in agriculture, medicine, and a hundred other fields that have given us the world of wonders we inhabit. No humans have ever lived as we do.

Everything's fine.

Technology's successes have been flat-out dazzling. Now, in our era, its side effects are emerging—the jaws behind the environmental crunch. Modern farming gives us astounding harvests, but its pesticides killed many of the insects that used to pollinate our crops and most likely did in the bees I found. The amazing new world we've created has created new residues. These have led to big unintended problems, from ozone holes to changing climate. These problems were so long-term that we couldn't see them for the first two hundred years. Suddenly, they're in sight, close enough to touch.

This environmental news may turn out to eclipse all the wars and other doings in your history textbooks. Other books and resources will give you much more detail on the science involved. My subject is how we're responding to the writing on the wall, with a focus on the United States. Progress, we now

We can't imagine life without plastic, but it's new on the scene. When the *Titanic* sank in 1912, its passengers' suitcases were leather, their combs ivory, and their toothbrushes made with bone handles and animal bristles.



For a look at some of the everyday chemicals in use all around us and the fight to regulate them, see journalist Bill Moyers's documentary Trade Secrets at billmoyers.com.



Anti-BP
(British Petroleum)
graffiti in Miami after
the 2010 Deepwater
Horizon oil spill.



know, doesn't bring only good things. Causes and effects can be separated by decades and jump over continents. National borders are increasingly beside the point, while the oceans and atmosphere are more important than ever. We're all trying to catch up with these facts. It's a changed world.

I'm no trained scientist. But life is always asking us to get a grip on realms outside our comfort zone, from understanding people different from us to making car-repair decisions. We collect information and chart a course that seems reasonable. "Suggested Resources," on page 181, offers some recommended information sources. Many more

We All Live Downstream

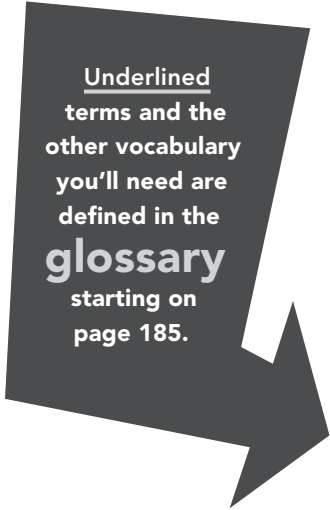
are sprinkled throughout; the book is a door leading to many other doors. “How to Weigh Information,” on page 154, gives pointers on judging what you encounter. This is a breaking story, with new data, events, and interpretations arriving daily. For fresh updates as well as info on classrooms that are reporting on their local environmental scenes, see the book’s website, EyesWideOpenUpdates.com.

The more I researched, the more I realized that science is only part of the environmental story. Money turns out to be as important as molecules. Science explains what nature is doing; money often explains what *we’re* doing. Power and politics are bound up with money. That’s why they’re included here and why I’ve drawn on history, psychology, and sociology to help explain what’s going on.

What you won’t find here: a list of Fifty Simple Things You Can Do to Save the Earth. Instead, the book is a briefing that will launch you on your own list. Notice. Gather information. Reflect. Refine. Act.

You’ve got power in those acts — what you buy, what you eat, how you get around, what candidates you support, where you throw your energies. The book’s goal is to give you a foundation under your decisions.

Let’s get started with a quick overview.



Underlined
terms and the
other vocabulary
you’ll need are
defined in the
glossary
starting on
page 185.

Noticing

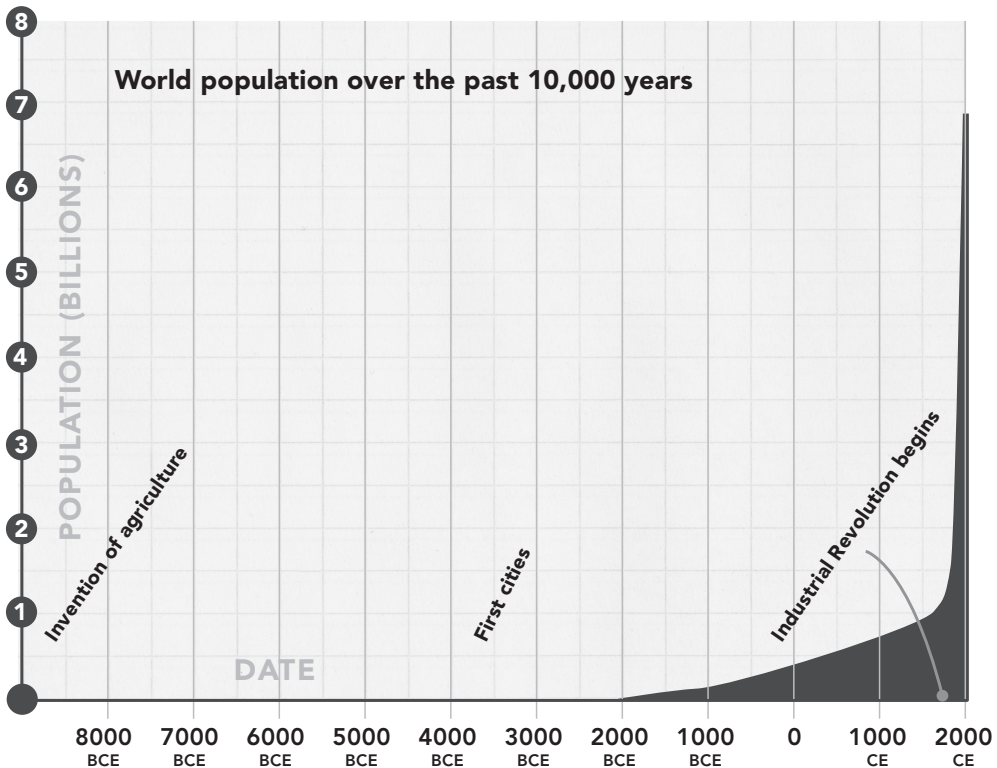
Where things
stand on five
key fronts

the essentials

1

Population

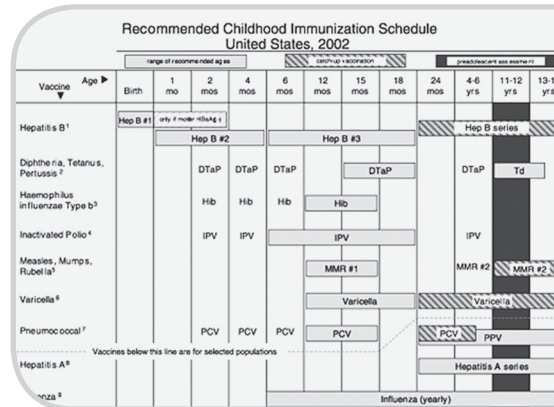
We've just crossed a new threshold: seven billion and counting. If you yawned, the Always-Been-This-Way illusion has you in its grasp. Check out this graph to free yourself:



Two restraints kept our numbers low for millennia — food shortage and disease. The spread of New World crops like corn and potatoes, the unlocking of genetics, and improved transportation all helped keep us better fed. Edward Jenner's 1796 inoculation against smallpox was the first giant step in controlling disease, leading to the vaccines you received when you were young and the antibiotics at your pharmacy. When death rates plummeted, numbers shot up. The chains holding population down were cast off.

This huge population is flowing out of the countryside and into cities worldwide in search of opportunity. The year 2008 saw more people living in cities than in the country for the first time in history. For many reasons, urban families have fewer children, causing growth rates to fall in the urban **West** decades ago. The same is happening now in most **developing countries**, where four-fifths of the world lives. The highest growth remains in the poorest nations, where birth control is least available and where parents often rely on children for labor but can't assume their young will survive childhood.

Despite falling birth rates, momentum is expected to keep our numbers rising into the next century. Population-tracking

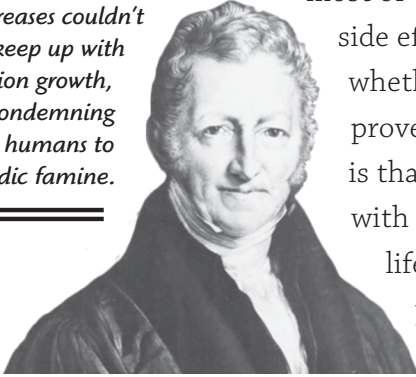


The West:

The most affluent nations, including the United States, Canada, Japan, Australia, and the countries of western Europe.

Developing countries, sometimes called the Third World:
Predominantly rural nations. Countries in between — China, India, Brazil, and others — are sometimes called newly industrialized countries.

*The British economist
Thomas Malthus
(1766–1834) believed
food increases couldn't
keep up with
population growth,
condemning
humans to
periodic famine.*



demographers expect us to add another two to four billion before world population levels off. High-tech advances have let us care for most of our increase to date but their side effects are piling up. It's unclear whether Thomas Malthus will be proven right or wrong. What's certain is that providing that many people with the necessities and luxuries of life from finite resources ties population to every other environmental issue.

2

Consumption

A hunter-gatherer's needs are few, but a Western citizen expects a car, paved streets, hot water on demand, airports, sewer lines, phone service, a refrigerator, computer, microwave, and a PlayStation . . . as a start.

To judge impact, population needs to be multiplied by consumption. The items above don't come from the store but from the Earth — from ores and fuels and trees and water. The West holds 20 percent of the world's people but uses 75 percent of its resources to fund its standard of living. From fast food to private cars, that resource-hungry and energy-intensive lifestyle is being adopted by the rest of the world. Soaring population × soaring consumption = unsustainable impact.

*To grasp the import of the
Western lifestyle's spread,
see the chapter
"Our Carbon Copies" in
Thomas Friedman's book
Hot, Flat, and Crowded.
For a close-up look at
Western consumption,
check out National
Geographic's documentary
Human Footprint.*

Why isn't it sustainable? Scarcity and side effects. The first applies especially to forests, soil, oceans, and freshwater aquifers underground. These resources are renewable, but they're being used up or polluted faster than nature can replenish them. With metals, fuels, and the manufacturing they support, side effects are the bigger issue, from health problems to rising temperatures caused by carbon dioxide (CO₂) and other heat-trapping greenhouse gases.

Unlike Malthusians, Cornucopians (from the Latin word meaning "horn of plenty") dispute claims of scarcity and believe human ingenuity will always keep supplies of food and resources ahead of population. You can read a profile of their best-known spokesman, Julian Simon, in Wired magazine's 1997 article "The Doomslayer."



Even critics of overconsumption, like Reverend Billy and his Church of Stop Shopping, depend on the basic Western lifestyle. Freegans go further than most, walking or biking to get around, bartering and scrounging for used goods instead of buying new ones.



A dead
seabird, its
stomach cavity
filled with
plastic trash

After we consume, we toss. Trash and toxins don't stay put. Heavy metals from computers enter groundwater. Tiny particles of plastic are herded across the Pacific by currents. China's air pollution blows east and triggers asthma in California. Sinks — the oceans, air, soil, and forests that store pollutants — are filling up. The world seemed boundless until recently. There seemed no obstacle to the developing world attaining the West's lifestyle and to everyone enjoying it indefinitely. We know more now. Time for a new plan.

3 Energy

Life until the eighteenth century was powered by renewables: wood, water, wind, and the sunlight that grew the food that fueled human and animal power. Flick on a switch today and you're likely drawing on a fossil fuel — oil, coal, or natural gas. The first powers our transportation, while the last two are burned to make most of our electricity. They're versatile, miraculously potent, and available in huge amounts. So what's not to like? Once again, scarcity and side effects.

As population and consumption rose, we drained the easily accessible supplies, especially noticeable with oil. This is why you're seeing pressure to tap oil that's riskier to get (in the deep waters of the Gulf of Mexico), that's located in protected areas (the Arctic National Wildlife Reserve), or that requires so much energy to process that there's little net gain (Canadian tar sands and American shale oil).



A train bringing coal to a power plant. It takes thousands of coal cars each day to make coal's share of U.S. electricity. That share has dropped from one-half to one-third since 2008 due to coal's pollution problems and cheaper natural gas supplies.

Peak oil is the moment when the amount of oil we can pump begins to decline — long predicted but not yet reached since we keep finding new sources and new ways to extract it. Cheap supplies do seem to have peaked. Today's new unconventional energy supplies take much more money and energy to get and process than old ones.



The heavy oil in Canada's tar sands is mixed with clay and sand, requiring much energy and hot water to separate it out and upgrade it to crude oil. The much fought-over Keystone XL Pipeline is designed to bring the oil to refineries along the Gulf Coast to be turned into gasoline and other fuels.

We love our cars. Cars run on gas. Gas comes from oil. We'll go to any lengths to get it.

Fossil fuels hold the energy trapped in millions of years of compressed plant and animal remains. Because they're finite, the worry has always centered on scarcity. New finds offer huge new supplies, but demand outside of the West has grown so large that scarcity is still an issue. Suddenly, though, it's been trumped by side effects.

Those side effects are many. The 2010 Deepwater Horizon oil spill off the Gulf Coast was the largest in U.S. history. Burning coal puts dangerous mercury and acid rain-causing sulfur into the air. But nothing tops the newly realized multipronged problems

of climate change. Of all the fossil fuels, coal releases the most greenhouse gases. Burning natural gas releases fewer, the reason it's been thought to be a safe bridge fuel to carry us to a clean-energy future. New findings that natural gas operations leak methane — a much more powerful greenhouse gas than CO₂ — have cast doubt on its smaller carbon footprint. At the same time, **fracking** has dramatically increased its supply.

Fortunately, there are alternatives. There's enough wind, solar, and other renewable energy sources to meet our demand many times over. Enough sunlight falls on the Earth in an hour to make all the electricity we use in a year. We'll need to install many more solar and wind systems and upgrade our grids — the networks that distribute electricity — to move power from areas rich in sun and wind. We'll need better batteries for storing energy when the sun isn't shining and the wind isn't blowing. Solar takes up lots of space; wind turbines kill birds. We'll need fixes for these and other problems. Progress is being made on all these fronts. Texas, the top oil-producing state, is now the U.S. leader in wind power.

There are other non-fossil fuel sources. Hydroelectric power from dams uses falling water, such a good deal that we've tapped most available sources and have lately regretted the side effects of damming rivers. Nuclear power comes with staggering costs

Fracking: Also called hydraulic fracturing, this process pumps water and chemicals into shale formations at high pressure to force out oil and natural gas.

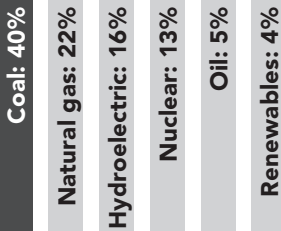
PRO: It opens vast new energy supplies that are close to home.

CON: It uses toxic chemicals that are suspected to have contaminated drinking water; fracking itself requires large amounts of water. You can read industry's safety claims at ExxonMobil's website; the documentary *GasLand* gives a different view.

Is power from the sun and wind only practical in the sunny Southwest or on windy coastlines? A 2013 Stanford University study showed that New York State could make all its electricity from wind and solar by 2030.

Noticing

How the world's electricity is made (2010):



and dangers: radioactive wastes, worries over making nuclear weapons, and safety, especially after a 2011 earthquake and tsunami caused radiation releases from reactors in Fukushima, Japan. Turning plants into biofuels sounds like the perfect solution, but some plants (such as corn) consume as much energy as the fuels give back. Algae, hydrogen, waves, tides, and geothermal power from the Earth's own heat are among other candidates still in the early stages.

Transitions between energy sources usually take decades, but we've never been so motivated before to hurry up. You're watching a race: can we find substitutes for fossil fuels before their effect on climate grows too great?

England—the birthplace of the coal-fueled Industrial Revolution—is now home to the London Array, the world's largest offshore wind farm, measuring ninety square miles, off the mouth of the Thames River.



4

Food

Population keeps climbing; the supply of farmland doesn't. Though malnutrition and starvation are still with us, massive famines predicted for the late twentieth century didn't arrive. Why? We learned how to make our finite farmland produce more food. The breakthroughs, known as the Green Revolution, gave us higher-yielding strains of grains and **GMOs**. Pesticides cut losses from insects. Refrigeration fought spoilage. Irrigation brought reliable water. We used natural gas to make fertilizers, vastly increasing supply. Thomas Malthus would be stunned.

Problems? Alas, the usual suspects. Scarcity of fresh water, accelerated by irrigation, has already reached many parts of the world. We're losing land to erosion — modern farming is hard on soil — and to roads and buildings for our growing population. When we plant crops to make biofuels like ethanol, we're subtracting from our food-producing acreage, using land to feed machines instead of people.

Side effects? Greenhouse gases are high on the list. Tractors, chemical fertilizers, irrigation pumps, freezers — all of these depend on fossil fuels, so much so that modern agriculture puts out more greenhouse gases than transportation does. Their effect on climate is boomeranging back on food production, with harvests threatened by rainfall disruptions,

GMOs: *Genetically modified organisms whose handpicked genes can help plants fight weeds, pests, and drought, and increase nutrients. Concerns include mutations, interbreeding between GMOs and wild populations, and ignorance of long-term effects on humans and the environment.*

To see the fossil fuels hidden in your burger, read Michael Pollan's New York Times article "Power Steer."



floods, and record droughts in the bread-baskets of Australia, Europe, and the United States. If the Green Revolution isn't sustainable, we won't have beaten Thomas Malthus after all.

Factory farming releases more than greenhouse gases. Its huge harvests come from monocultures — growing large numbers of the same thing in one place. This is highly efficient and keeps prices low. But because it invites losses from disease and pests, it requires large doses of pesticides for plants, antibiotics for animals, and a blind eye to animals' living conditions. The result is that our groundwater can contain pesticides and growth hormones. Nitrogen from fertilizers has given us dead zones in river deltas. Antibiotics in milk and meat have spawned drug-resistant infections, a major problem in hospitals.

A morsel of news about meat: meat-eating has tripled since 1970. This matters. It takes a large amount of grain and water fed to animals to make a much smaller amount of meat — an average ratio of seven to one. This is the reason that meat was a luxury in most of the world until lately. Today, we're feeding half our grain to animals, losing enough food in the bargain to feed billions for the sake of meat's flavor and protein. As the West's meat-heavy diet spreads, tropical forests are felled to increase land for grazing or growing animal feed, releasing huge quantities of greenhouse gases. Cheap meat — fast food's

foundation — is cheap only if you leave out its true costs and consequences.

5

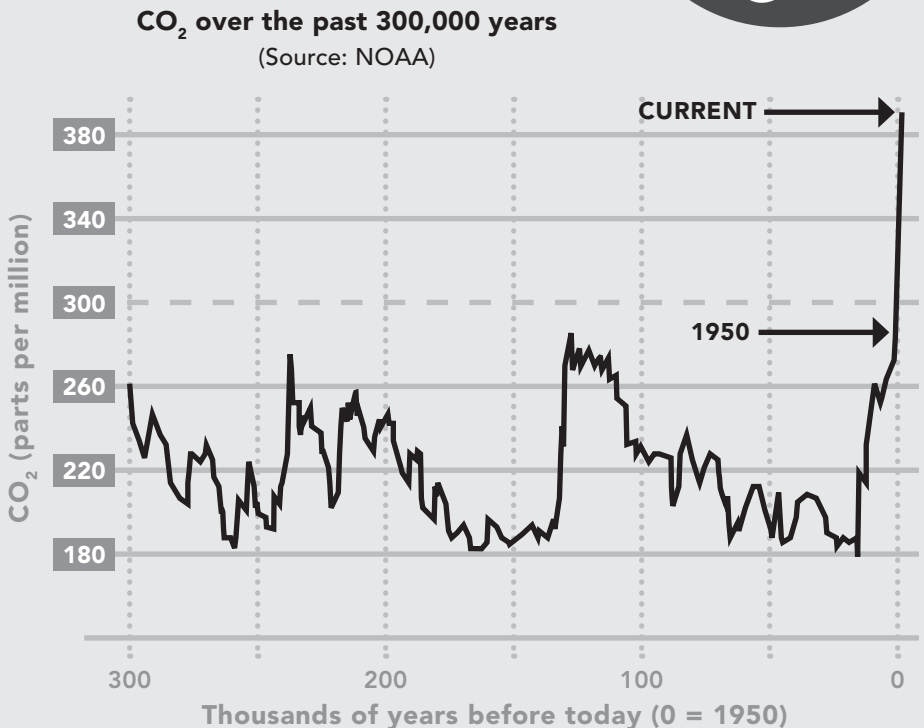
Climate

All of these issues intersect at climate, altering it and being altered by it in return.

Rising population and consumption, the coming of the car, changes in agriculture, and deforestation all combined to put enough greenhouse gases into the atmosphere to raise global air and water temperatures.

*For the full story behind your chicken nuggets and Big Mac, check out the book *Chew on This* by Eric Schlosser and Charles Wilson or the documentary Food, Inc.*


Graphs like this point strongly to climate change being anthropogenic — caused by humans.



Scientists in the 1890s predicted this. The confirmations began showing up a century later, from spreading deserts to rising sea levels. Oceans absorbing increased CO₂ in the air have become more acidic. Extreme weather events predicted by models have become common. If we keep burning fossil fuels, we're headed for global disaster.

The good news: unlike an Earth-bound asteroid, we inadvertently made this problem and ought to be able to unmake it. The challenge: switching to green alternatives quickly enough. Fossil fuels permeate our lives. We'll need green sources for electricity to replace coal and natural gas, green fuels or electricity-powered transportation to replace oil, and a way to grow just as much food without fossil fuels. We've started down this path. Greenhouse gases already in the atmosphere will continue warming our climate for years. Bringing them down as low as we can as fast as we can is the best thing we can do for our future.

Climate is complex. Seawater can warm inconspicuously, but at 79°F it begins to promote hurricanes. There's a lot we don't know about such thresholds. The same goes for positive feedback loops that magnify effects, as when higher temperatures melt tundra, which releases methane, which raises temperature further. We used to think climate changed only slowly, but lately we've learned that it's swerved suddenly in Earth's past



The United Nations' Intergovernmental Panel on Climate Change (IPCC), the most authoritative body studying climate, assigns a 95–100 percent likelihood to humans' role in raising temperature, a view shared by the National Academy of Sciences, NASA, and the overwhelming majority of climatologists. There's plenty of debate about what might happen next, but virtually none among scientists on how we got here.

If we keep burning fossil fuels at current rates, we're on track to raise temperature 3.5 °F (2 °C) over pre-industrial levels around 2040. For what we can expect at each 1 °C rise, see Mark Lynas's book Six Degrees: Our Future on a Hotter Planet.

many times. Abrupt climate change is now a hot research topic.

What can we do? Mitigation (reducing the causes by cutting carbon emissions) and adaptation (preparing for the effects) have lately been joined by research in improving our situation through geoengineering projects like whitening clouds to reflect more of the sun's rays. We've raised temperature 1.4° since the start of the Industrial Revolution. Holding the increase to an additional three to four degrees will require major shifts at every level, from international bodies to individual households, and on all the issues flowing into climate.



For a powerful argument for keeping fossil fuels buried rather than burned, read Bill McKibben's 2012 article "Global Warming's Terrifying New Math" in *Rolling Stone*. The United Nations hopes to cap CO₂ levels at 450 parts per million (ppm), but others—like McKibben's group 350.org—feel we won't be safe unless we get it down to 350. The figure recently passed the 400 mark. You can find the latest reading at co2now.org.

Greenhouse gases, sea-level changes, and climate-related extinctions are anything but new. For the long view, check out J. D. Macdougall's book A Short History of Planet Earth: Mountains, Mammals, Fire, and Ice. Then spring forward with Curt Stager's book Deep Future: The Next 100,000 Years on Earth. A seismic shift in your perspective is guaranteed.

This book uses Fahrenheit (F), but Celsius (C) figures are common elsewhere, since scientists and nearly all other countries use that scale. A change of 1°C = 1.8°F. See the note to "We've raised temperature 1.4°" on p. 162.

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Paul Fleischman

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