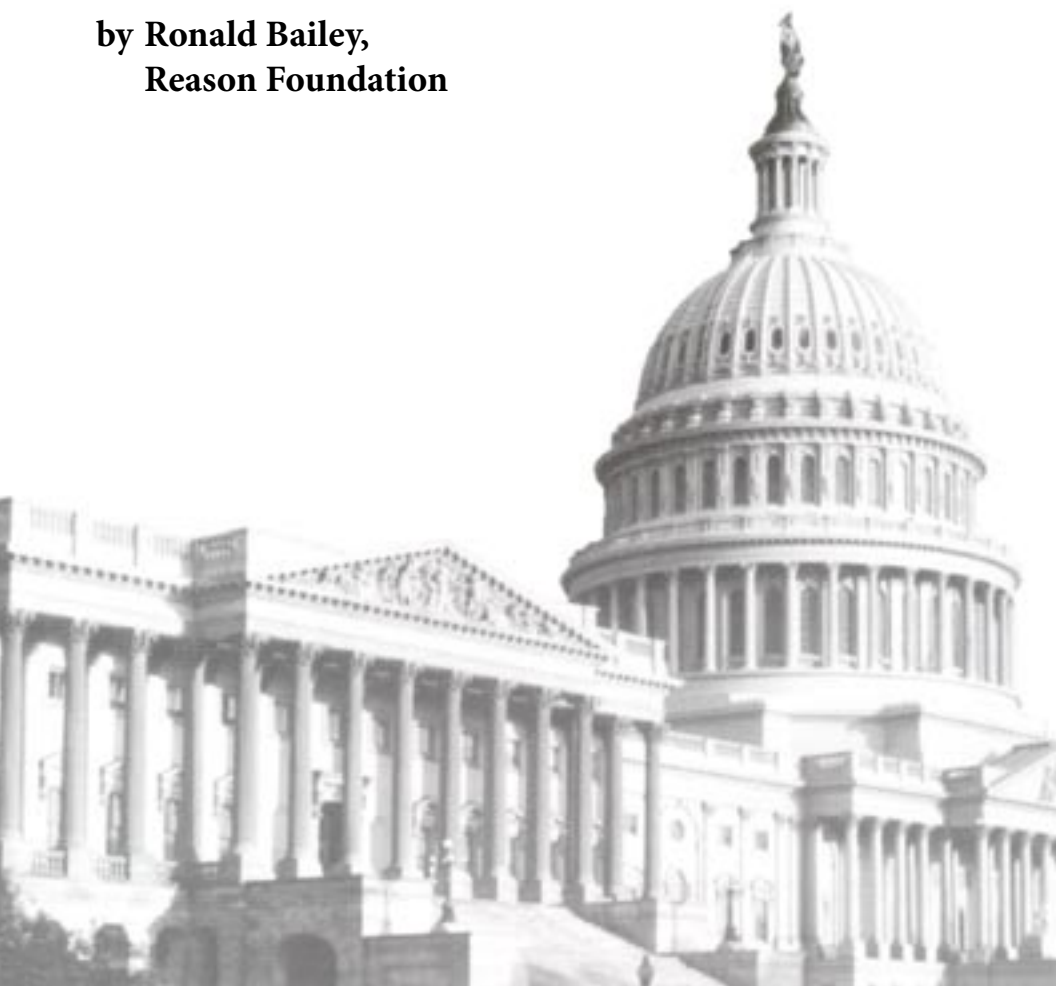


T E S T I M O N Y

THE IMPACT OF SCIENCE ON PUBLIC POLICY

by **Ronald Bailey,**
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REASON MAGAZINE

TESTIMONY BEFORE THE
HOUSE SUBCOMMITTEE
ON ENERGY AND MINERAL RESOURCES
108TH CONGRESS

FEBRUARY 4, 2004

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THE IMPACT OF SCIENCE ON PUBLIC POLICY

My name is Ronald Bailey. I am the science correspondent for the public policy magazine *Reason* and I have written and reported on scientific and environmental policy for more than two decades for various publications. I am also an adjunct scholar at the Cato Institute and at the Competitive Enterprise Institute. I am the author of one book on environmental predictions and policy (*Eco-Scam: The False Prophets of Ecological Apocalypse*, St. Martin's Press, 1993). I am also the editor for three books on environmental issues: *The True State of the Planet*, Free Press, 1995; *Earth Report 2000: Revisiting the True State of the Planet*, McGraw-Hill, 2000; and *Global Warming and Other Eco-Myths*, Prima Publishing, 2003.

Since this hearing is devoted to trying to assess the impacts of scientific information on public policy, I think that looking back at the forecasts of what the state of the planet was predicted to be at the end of the last millennium would be a good place to start. Here I will be looking chiefly at past predictions dealing with three topics: depletion of nonrenewable resources, global population growth and famine, and projected rates of species extinction.

Resource Depletion

First, let us look at concerns over depleting so-called nonrenewable resources. This thesis was most famously propounded in the 1972 *Limits to Growth* report to the Club of Rome and later in President Jimmy Carter's *Global 2000* report. The *Limits to Growth* thesis got a big boost when the Arab countries unleashed their oil embargo in 1973. It didn't hurt that the *Limits to Growth* report was also featured on the front page of *The New York Times* when it was released. Ultimately, the report sold 10 million copies worldwide.

The *Limits to Growth* report includes a table listing all the resources that were supposedly going to run out. The report's au-

thors projected that, at the exponential growth rates they expected to occur, known world supplies of zinc, gold, tin, copper, oil, and natural gas would be completely exhausted in 1992.

Harrison Brown, a respected member of the National Academy of Sciences, published predictions in *Scientific American* in 1970 which estimated that humanity would totally run out of copper by 2000, and that lead, zinc, tin, gold, and silver would all be gone by 1990.

In 1976, MacArthur Foundation Fellow and Heinz Award in Environment laureate Paul Ehrlich chimed in with his book, *The End of Affluence*. He stated that “before 1985 mankind will enter a genuine age of scarcity...in which the accessible supplies of many key minerals will be facing depletion.” In 1980, the Carter administration issued its gloomy *Global 2000* report, which projected that the price of oil in 1995 would be \$40 per barrel in 1979 dollars.

In the 1990s, textbooks like *The United States and Its People* told impressionable schoolchildren that “some scientists estimate that the world’s known supplies of oil, tin, copper, and aluminum will be used up within your lifetime.” Another textbook, *Concepts and Challenges in Earth Science*, asserts that once “nonrenewable resources are used up, their supplies are gone” (just try arguing with logic like that!). A science text, *Biology, An Everyday Experience*, connects the dots to draw the obvious conclusion: “Governments must help save our fossil fuel supply by passing laws limiting their use.”

I did a series of reports when I was at *Forbes* magazine in 1990. I went up to MIT to interview Professor Jay Forrester and asked him, “I re-read *The Limits to Growth* report; what happened?” Basically, Professor Forrester, who was the godfather of this project, looked at me and said, “I think we stressed the physical resources side a little too much.” Of course, the report would not have made it to the front page of *The New York Times* had they not stressed the imminent depletion of nonrenewable resources.

Even the generally alarmist Worldwatch Institute acknowledged in its 2001 *Vital Signs* report: “Nonfuel commodities now fetch only 46 percent as much as in the mid-1970s.” Indeed,

Worldwatch admitted, “food and fertilizer prices are about one-fourth their 1974 peak.” Even the price of crude oil, which has risen in the last couple of years, “nevertheless remains at about half the zenith it achieved in 1980.” In fact, overall, nonfuel commodities cost only a third of what they did in 1900. As everyone knows, lower prices generally mean that things are becoming more abundant, not scarcer.

The U.S. Geological Survey estimates that at present rates of mining, known reserves of copper will last 33 years; zinc, 25 years; silver, 14 years; tin, 23 years; gold, 16 years; and lead, 23 years. It may sound like humanity is running out of these minerals, but the fact is that these levels have remained about the same for the past three decades. Just as a householder doesn’t stock all the groceries she’ll need for the rest of her life, similarly mining companies don’t look for new deposits and open new mines or develop new, more efficient, technologies until their larders are drawn down. What about oil? The survey estimates that global reserves could be as much as 2.1 trillion barrels of crude oil – enough to supply the world for the next 90 years.

Population Growth

Now onto population growth. Let’s begin with a little walk down memory lane. In 1968 Stanford University biologist, the aforementioned Paul Ehrlich, famously predicted in his best-selling book *The Population Bomb*: “The battle to feed all humanity is over. In the 1970s the world will undergo famines; hundreds of millions of people are going to starve to death in spite of any crash programs embarked upon now.”

For the first Earth Day in 1970, Ehrlich, in an article entitled “Eco-Catastrophe” in *The Progressive* magazine, offered a scenario in which four billion people would starve to death between 1980 and 1989, 65 million of whom would be Americans.

Ehrlich is not alone in making dire predictions of imminent global famine. Lester Brown, the founder of the Worldwatch Institute, declared in 1981 that “the period of global food security is

over. As the demand for food continues to press against supply, inevitably real food prices will rise. The question no longer seems to be whether they will rise, but how much." In 1994, Brown wrote in his annual *State of the World* report: "The world's farmers can no longer be counted on to feed the projected additions to the world's population." And Brown warned in his 1997 report: "Food scarcity will be the defining issue of the new era now unfolding, much as ideological conflict was the defining issue of the historical era that recently ended." He continues: "rising food prices will be the first major economic indicator to show that the world economy is on an environmentally unsustainable path."

Well, what happened? First, let's review a few things. Why did global population increase so dramatically in the 20th century, rising from about 1.6 billion in 1900 to a bit over six billion today? As Harvard University demographer Nicholas Eberstadt puts it: "Global population increased not because people started breeding like rabbits, but because they stopped dying like flies."

What happened is that babies stopped dying shortly after being born, as had been the case throughout the millennia for human beings. The global infant mortality rate dropped from a couple of hundred per thousand to below 50 per thousand today. The result is that human life expectancy has more than doubled from an average of only 30 years in 1900, rising to 46 years by 1950, and is now 66 years in the year 2001. That is a global figure. The World Health Organization thinks life expectancy will increase to 73 years on average by the year 2020. I would submit to you that this is truly evidence for the greatest improvement of the human condition in all of history.

What about future population trends? One still hears from activists that the world population will rise to 12 to 15 billion by 2050, or if they are being more cautious—and they have been lately—to that amount by the year 2100. But there is a lot of evidence to suggest that is very unlikely.

First let's look back at the predictions made in the 1970s. If famine were somehow miraculously avoided, Paul Ehrlich and Lester Brown both predicted that world population in 2000 would

be seven billion people. In fact, as I have already mentioned and as we all know, world population is only a bit over six billion. Keep in mind that there is no predictive theory of demography. However, everyone acknowledges that the rate of world population growth is rapidly decelerating now.

The United Nations' *World Population Prospects*, the 2000 revision, has dropped its medium world population projections for 2025 to 7.8 billion people. Only four years earlier in 1996, it had projected a world population in 2025 of 8.4 billion. In other words, 600 million people disappeared in only four years. They are not going to be with us. This decline in the growth rate is going much faster than many people think. According to many other demographers, this impressive drop indicates that the world population trends are likely to track the UN's low variant trend, in which world population will top out at around 7.5 billion or so in 2040 and then begin to drop. In fact, if the low variant trend is followed out, world population in 2100 would be back to six billion. Even *Nature* magazine in July 2001 published work that concludes that it is exceedingly unlikely that world population will ever exceed ten billion people.

What has happened, of course, is that women are having fewer children than they did, dropping from nearly six children per woman in the 1960s to around 2.6 today, and that rate continues to fall. The replacement rate is 2.1 children per woman, and all developed countries have already fallen below that, including the United States.

Of course, the reason that Ehrlich and others predicted demographic disaster was their devotion to Malthusian theory. I have always been impressed by the fact that ecologists and biologists, for some reason, seized upon very early economic theory to inform their initial theories in the 19th century, but refuse to listen to economists nowadays. In any case, what confounded their predictions of doom is the advent of the Green Revolution, which was nurtured by Nobel Peace Prize winner Norman Borlaug and his colleagues. The Green Revolution has been summed up as "making two blades of grass grow where only one could grow before." Indeed, food production has more than doubled since the 1960s.

By the way, Ehrlich was a great skeptic of the Green Revolution. He was quoted in *Life* magazine saying: “It will soon turn brown.” Since 1970 the amount of food grown per person globally has increased 26 percent, even as the world population nearly doubled. The International Food Policy Research Institute recently reported: “World market prices for wheat, maize, and rice – adjusted for inflation – are the lowest they have been in the past century.” In fact, they are all 90 percent lower than they were in 1850. People are now paying 10 percent of what people paid in 1850 for their food, the basics of life. According to the World Bank, food production did increase 60 percent between 1980 and 1997. We can conclude that food is cheaper and more abundant than it has ever been in all of human history.

And more good news: The amount of land devoted to growing crops has barely increased over the past 30 years, meaning millions of square miles of land have been spared for nature with concomitant benefits for biodiversity protection. So, Malthus, Ehrlich, Brown, and many other ecologists were spectacularly wrong. More food does not mean more people. In fact, it turns out, unfortunately for me, that more food means more fat old people.

Species Extinction

Let me close with a brief tour of past predictions about species extinctions. Again the predictions by concerned scientists were way off the mark. In 1970, Dr. S. Dillon Ripley, secretary of the Smithsonian Institute, predicted that in 25 years, somewhere between 75 and 80 percent of all the species of living animals would be extinct. That is between 75 and 80 percent of all species of living animals would be extinct by 1995. In 1975, Paul Ehrlich and his biologist wife, Anne Ehrlich, predicted that “since more than nine-tenths of the original tropical rainforests will be removed in most areas within the next 30 years or so, it is expected that half of the organisms in these areas will vanish with it.” It’s now 29 years later and nowhere near 90 percent of the rainforests have been cut.

In 1979, Oxford University biologist Norman Myers suggested

in his book *The Sinking Ark* that 40,000 species per year were going extinct and that 1 million species would be gone by the year 2000. Myers suggested that the world could “lose one-quarter of all species by the year 2000.” At a 1979 symposium at Brigham Young University, Thomas Lovejoy, who is now the president of The H. John Heinz III Center for Science, Economics, and the Environment announced that he had made “an estimate of extinctions that will take place between now and the end of the century. Attempting to be conservative wherever possible, I still came up with a reduction of global diversity between one-seventh and one-fifth.” Lovejoy drew up the first projections of global extinction rates for the *Global 2000 Report to the President* in 1980. If Lovejoy had been right, between 15 and 20 percent of all species alive in 1980 would be extinct right now. No one believes that extinctions of this magnitude have occurred over the last three decades.

What did happen? Most species that were alive in 1970 are still around today. “Documented animal extinctions peaked in the 1930s, and the number of extinctions has been declining since then,” according to Stephen Edwards, an ecologist with the World Conservation Union, a leading international conservation organization whose members are non-governmental organizations, international agencies, and national conservation agencies. Edwards notes that a 1994 World Conservation Union report found known extinctions since 1600 encompassed 258 animal species, 368 insect species, and 384 vascular plants. Most of these species were “island endemics” like the Dodo. They are particularly vulnerable to habitat disruption, hunting, and competition from invading species. Since the establishment of an endangered species list only seven species have been declared extinct in the United States. Four are freshwater fish: the Tecopa pupfish (1982), the Amistad gambusia (1987), the Cisco longjaw (1983), the blue pike (1983); a freshwater clam, the Sampson’s pearlymussel (1984), and two small birds, the dusky seaside sparrow (1990) and the Santa Barbara song sparrow (1983).

Let me say clearly from a personal perspective that species extinction is undesirable and should be avoided when reasonably

possible. Extinction really is forever. But to put it in perspective, *Science* magazine just published an article called “Prospects for Biodiversity” by Martin Jenkins, who works for the United Nations Environment Programme-World Conservation Monitoring Center that bears on this topic. Jenkins points out that even if the dire projections of extinction rates being made by conservation advocates are correct they “will not, in themselves, threaten the survival of humans as a species.” The *Science* article notes, “In truth, ecologists and conservationists have struggled to demonstrate the increased material benefits to humans of ‘intact’ wild systems over largely anthropogenic ones [like farms]....Where increased benefits of natural systems have been shown, they are usually marginal and local.”

Lessons to be Learned

What are the lessons to be learned from this record of badly exaggerated predictions of environmental disaster? First, scientists, even well meaning ones, don’t know as much as they think they do. They generally go wrong because they ignore or misunderstand how human beings interact with the natural world and with other people, that is, they are largely ignorant of economics. That profound economic ignorance is summed up in Paul Ehrlich’s famous $I = PAT$ equation where I stands for environmental Impact and P is population, A is affluence, now usually referred to as consumption, and T is technology. The $I = PAT$ equation still appears in many ecology textbooks. And all of these factors are considered to be negative influences on the natural environment and they are not merely added together they are multiplied. However, the $I = PAT$ equation gets it almost entirely backward. Population is at worst a neutral influence and affluence and technology are positive influences on the state of the environment. The plain fact is that it is in the rich developed countries where the air is becoming clearer, the streams cleaner, and the forests are expanding. Affluence and technology are what make an improving natural environment possible. Poverty is the greatest threat to the natu-

ral world — there is nothing more dangerous to the natural world than a hungry human being.

The problem is that biologists and ecologists tend to think that human beings are merely more clever herds of deer. When deer run out of their sustenance, they die. When human beings begin to run out, they turn their brains and their social institutions to producing more. Science can tell us what may be problems, but it can't tell us what to do about them. Solutions depend on a deep understanding of human values, politics, and economics. Scientists are no more qualified to pronounce on those topics than their non-scientific confreres and fellow citizens.

Policy makers must be very cautious about rushing to adopt policies to respond to alleged environmental crises. As physicist Edward Teller reminded us: "Highly speculative theories of worldwide destruction — even of the end of life on Earth — used as a call for a particular kind of political action serve neither the good reputation of science nor dispassionate political thought."

I hope that I have also made it clear that it is very important to hold people to account for their past predictive failures. Also, have patience, the scientific process and peer review will eventually point us to the truth. Finally, it should be clear that environmentalist advocates keep making the same mistake over and over: they constantly underestimate the power of technology and science, and underestimate the power of markets to solve emerging problems. Thank you for your attention and I would be happy to answer any questions. ■

For more details please see my articles "Running Out of Evidence: The environmental movement's collapsing case that we are running out of natural resources" published in the November/December 1998 issue of *The Philanthropy Roundtable*. Also see my chapter "The Progress Explosion: Permanently Escaping the Malthusian Trap" from *Earth Report 2000: Revisiting the True State of the Planet*, (Free Press, 2000), a version of which was published in *The National Interest*.

ABOUT RONALD BAILEY

Ronald Bailey is the science correspondent for *Reason*. He writes a weekly column for *Reason Online* dealing with science and technology policy.

Previously, he produced several weekly public television series including “Think Tank” and “TechnoPolitics,” as well as several documentaries for PBS television and ABC News. His articles and reviews have appeared in *The Wall Street Journal*, *The Washington Post*, *Commentary*, *National Review*, *Forbes*, and *Readers Digest*. He has lectured at Harvard University, Yale University, Morehouse University, the Massachusetts Institute of Technology, the University of Virginia, McGill University, and the Instituto de Libertad y Desarrollo (Chile).

He is a member of the Society of Environmental Journalists and the American Society for Bioethics and Humanities. Mr. Bailey edited *Global Warming and Other Eco-Myths: How the Environmental Movement Uses False Science to Scare Us to Death* (Prima Publishing, 2002) and *Earth Report 2000: Revisiting The True State of The Planet* (McGraw Hill, 1999). He is the author of *ECOSCAM: The False Prophets of Ecological Apocalypse* (St. Martins Press, 1993). His new book, *BioFreedom: How the Biotech Revolution is Ending Disease, Hunger and Death*, will be published by Prometheus Press later this year.

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