

The Population Bomb Revisited

Paul R. Ehrlich* and Anne H. Ehrlich†

* Paul R. Ehrlich is Bing Professor of Population Studies in the department of Biology at Stanford University.

† Anne H. Ehrlich is associate director and policy coordinator of the Center for Conservation Biology at Stanford University.

They co-authored *The Population Bomb* in 1968.

Email: Pre =a= stanford.edu

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Abstract

The Population Bomb has been both praised and vilified, but there has been no controversy over its significance in calling attention to the demographic element in the human predicament. Here we describe the book's origins and impacts, analyze its conclusions, and suggest that its basic message is even more important today than it was forty years ago.

It has now been forty years since we wrote *The Population Bomb* (Ehrlich 1968). The book sold some 2 million copies, was translated into many languages, and changed our lives. There is not much disagreement about the significance of the volume – whether a person agrees with it or not, *The Population Bomb* helped launch a worldwide debate that continues today. It introduced millions of people to the fundamental issue of the Earth's finite capacity to sustain human civilization. We believe that despite its flaws, the book still provides a useful lens for viewing the environmental, energy, and food crisis of the present time.

On a more personal level, it got Paul labeled the “population bomber” and categorized as someone who thought overpopulation was the sole problem of humanity. To this day when he lectures or appears on the media, he is pursued by inaccurate or out of context “quotes” from *The Bomb*. Such quotes are frequently assumed to represent our current thinking on many topics – including ones on which we have subsequently written entire books.

The Population Bomb was written in response to a request that Paul summarize arguments he had been making in the media that the population issue should be taken up by the growing environmental movement. That movement had been triggered in no small part by Rachel Carson's *Silent Spring* (Carson 1962). The suggestion

came in early 1968 from David Brower of the Sierra Club and Ian Ballantine of Ballantine Books. They hoped to get the population book out in time to influence the presidential election (how naïve we were!), and we wrote the book in a few weeks of evenings. Although the publisher insisted on a single author, it was from the beginning a joint effort. And the publisher exercised his right to select the title; our preference was Population, Resources, and Environment.

Reaction to the Population Bomb

The book has been seen, at the very least to some on the lunatic fringe, as of some enduring importance. It was listed by the *Intercollegiate Review* as one of the fifty worst books of the 20th century, along with John Kenneth Gailbraith's *The Affluent Society*, John Maynard Keynes' *General Theory of Employment, Interest, and Money*, and John Rawls' *A Theory of Justice*.¹ In *Human Events*' list of the “Ten Most Harmful Books of the Nineteenth and Twentieth Centuries,” it came in 11th place (“honorable mention”); even so, it bested Charles Darwin's *The Origin of Species* and *Silent Spring* by Rachel Carson, though it was outranked by Keynes (again), Marx's *Das Kapital*, and *The Kinsey Report*, among others.²

Much of the negative response to *The Population Bomb*, from both the far right and the far left, was clearly a reaction to its main message – that it can be a very bad thing to have more than a certain number of people alive at the same time, that Earth has a finite carrying capacity, and that the future of civilization was in grave doubt.

Originally Marxists thought that “The productive power at mankind's disposal is immeasurable” (Engels 1844), and thus they simply couldn't envision overpopulation. The far left in modern times found the advocacy of limiting population growth immoral. They saw the basic issue not as overpopulation but as maldistribution

of resources and worried that the far right would use overpopulation as an excuse to promote births of only the “right kind” (skin color, religion, national origin) of people – as was demonstrated by the eugenics movement and racist elements in the population control movement. The latter problem has caused Paul to put great effort into refuting the idea, once expressed by William Shockley,³ that people are color-coded for quality (Ehrlich and Holm 1964, Ehrlich and Feldman 1977, Ehrlich 2000). Conservatives, wed to the idea that free markets could solve any problem, didn’t like the idea that population size was a legitimate area for government intervention.

Those opposed to contraception, abortion, and sex education in the United States of course hated it, while the sexually repressed simply didn’t like any discussion of reproductive issues in their sex-soaked society. None of those constituencies seemed to understand that the fundamental issue was whether an overpopulated society, capitalist or socialist, sexually repressed or soaked, egalitarian or racist/sexist, religious or atheist, could avoid collapse. Four decades of largely ignored population growth and related issues -- especially patterns of rising consumption and their environmental effects -- since then make collapse now seem ever more likely and possibly sooner than even many pessimists think.

In late June 2008 James Hansen, a top NASA scientist, told Congress the climate situation has gotten so bad that the civilization’s only hope is drastic action. He asserted that the world has long passed the “dangerous level” for greenhouse gases in the atmosphere and must get back to 1988 levels. In his view, the volume of man-made carbon dioxide already injected into Earth’s atmosphere can remain for no more than a couple more decades without causing changes such as mass extinctions, ecosystem collapses, and dramatic sea level rises. In summary, he said, “We’re toast if we don’t get on a very different path.”⁴ And, of course, any path that satisfactorily deals with climate disruption would necessarily involve control of human numbers.

Perhaps the biggest barrier to acceptance of the central arguments of *The Bomb* was—and still is—an unwillingness of the vast majority of people to do simple math and take seriously the problems of exponential growth. This is not just the man in the street – it includes individuals who otherwise might be considered highly educated. A classic example was the statement by a professor of business administration, specializing in mail-order marketing, Julian Simon, who found prominence as a critic of environmental science: “We now have in our hands – in our libraries, really – the technology to feed, clothe, and supply energy to an ever-growing population for the

next 7 billion years” (Myers and Simon 1994, p. 65)⁵. In 1994, when that was written, the world population was growing at 1.4 percent annually. At that rate it would only take some 6000 years for the mass of the human population to equal the mass of the universe.

A similar lack of understanding of the power of exponential growth in population and consumption was demonstrated by Wilfred Beckerman, Professor of Political Economy at University College London before moving to Oxford. According to Beckerman, the problems associated with exponential growth in the use of any finite resource were “just as true in Ancient Greece.... This did not prevent economic growth from taking place since the age of Pericles.... [T]here is no reason to suppose that economic growth cannot continue for another 2500 years.” (Beckerman 1972).⁶ Assuming “slow” economic growth at a little over one percent per year, if England had existed in Pericles’ time (ca. 450 BC), the average family income would have had the annual buying power of about a millionth of a penny (Parsons 1977)! That is, if one started with a millionth of a penny in ancient Greece, and invested it at an interest rate of one percent annually, it would have generated about the same amount of money as a British family’s income in 1977.

Equally silly statements are made about the relationship of human numbers to prosperity. As late as 2007, echoing Chairman Mao⁷ and Julian Simon,⁸ demographer Nicholas Eberstadt called people the “wealth of modern societies” (Eberstadt 2007). People, of course, can be regarded as productive assets (embodying, as economists would put it, “human capital”), but it is an error to consider increases in human numbers as automatically expanding real wealth – the capacity for well-being. Given the growing scarcity of natural resources, population growth normally reduces per capita genuine wealth, and can even shrink a nation’s total wealth (e.g., Arrow et al. 2004). If wealth were a function of population size, China and India each would be three to four times as rich as the United States and more affluent than all the nations of Europe combined, Africa’s wealth would outstrip that of North America or Europe, and Yemen would be three times as well off as Israel (Population Reference Bureau 2008).

Population since *The Bomb*

World-renowned scientist James Lovelock, whose invention of the apparatus that allowed discovery of the threat to the ozone layer and saved humanity, recently stated: “We have grown in number to the point where

our presence is perceptibly disabling the planet like a disease.”⁹ When *The Population Bomb* was written, there were roughly 3.5 billion people in the world. Four decades later there are 6.7 billion people (Population Reference Bureau 2008), meaning that the world population has nearly doubled since *The Bomb* rolled off the presses. Despite this growth, there have been some remarkable advances on the population front. Birthrates have dropped in most of the world, partly in response to government-sponsored programs in education (especially of women), giving women job opportunities, making contraceptive information and materials accessible – and to economic factors.

Some of the lowest birthrates are now found in the rich, fully industrialized nations of Europe and in Japan. That’s fortunate in one respect because it is the high-consuming rich nations that place the greatest pressure on humanity’s staggering life-support systems (Ehrlich and Holdren 1971, Ehrlich and Ehrlich 2005). The big exception is the United States, which is a center of over-consumption and whose population continues growing because of a relatively high birthrate (average family size about 2.1 children, compared with 1.4 in Italy and Spain and 1.3 in Germany and Japan) and high immigration rate (4 per thousand, with Italy the same, Spain 7, Germany 0, and Japan 0). The nation has recently been in the strange position of debating immigration policy without ever discussing population policy.

Sadly, the United States has also been plagued by administrations, first under Ronald Reagan and then under George W. Bush, that have in effect encouraged high birthrates by withholding aid to family planning programs that allow women access to safe abortion. Even so, the majority of developing countries have adopted family planning programs, and many have substantially reduced their birthrates as the perception of children as valued farm labor has changed with urbanization to one in which children do not join the labor force early and are expensive to educate. Meanwhile some high-consuming European populations have even started shrinking in size – ironically accompanied by complaints about “aging populations.” That the change in age distribution is inevitable as population growth stops, and is often beneficial and easily managed, is ignored (Ehrlich and Ehrlich 2006). More importantly, so is the vast benefit of lessening pressure on our already battered life-support systems.

Thus the central goal of *The Population Bomb*, to encourage the adoption of policies that would gradually reduce birthrates and eventually start a global decline toward a human population size that is sustainable in the long run, has been partially achieved. Rather than

doubling the population in 35 years, as continued growth at the 1968 rate would have done, we may not reach that level – 7 billion – until 2013, 45 years after *The Bomb* was published.

Fortunately, the implications of population growth for our future overall well-being are gradually working their way back into the public and political consciousness today (e.g., Feeney 2008), especially in terms of the harm growth does in retarding the development of poor nations (Campbell et al. 2007). That’s very fortunate because the depressing fact is that, even with the good news on the population front, humanity may add some 2.5 billion people to the population before growth stops and (we hope) a slow decline begins.

It is essential to try to minimize those additions because they will have a disproportionate negative impact on our life-support systems. Our ancestors naturally farmed the richest soils and used the most accessible resources first (Ehrlich and Ehrlich 2005, p. 102). Now those soils, where people first settled as they took up farming, have often been eroded away or paved over, and societies are increasingly forced to turn to marginal land to grow more food. Instead of extracting rich ores on or near the surface, deeper and much poorer deposits must be mined and smelted today, at ever-greater environmental cost. Water and petroleum must come from lower quality sources, deeper wells, or the latter often from far beneath the ocean, and must be transported over longer distances. The environmental and resource impacts of past and future population growth will haunt humanity for a long time.

Where *The Bomb* was on the right track

Aside from its general emphasis on the perils of population growth, the book also drew early attention to over-consumption as a problem (p. 133)¹⁰, something that is increasingly seen as a pattern that may be more difficult to alter than over-reproduction (see, e.g., Ehrlich and Goulder 2007, Ehrlich and Ehrlich 2008). The U.S. share of global consumption has dropped substantially since *The Bomb* was published; as the book predicted, its share of world population has also dropped from a little under 7 percent to less than 5 percent. Yet the United States still consumes nearly a quarter of Earth’s resource flows. While the factors influencing reproductive patterns are now relatively well recognized, and thus the ways in which family-size choices can be altered, equivalent understanding of consumption choices has not been established.

What about the often-cited warnings about world population outstripping food supplies? Our skepticism on the oceans as a source of increased food has been more than borne out. We wrote, referring to a claim in an editorial in the January 28, 1967 issue of *Saturday Evening Post* (p. 86): “What about those ‘unmeasurable riches’ of the sea? Unhappily, they have been measured and found wanting. The notion that we can extract vastly greater amounts of food from the sea in the near future is quite simply just another myth promoted by the ignorant or the irresponsible” (p. 99). The wild seafood catch has not kept pace with population’s rise. Despite escalating (and environmentally dangerous) efforts at herding fishes in the oceans (“fish farming”), the total yield from the seas (wild plus farmed) has only increased about 20 percent per person, mostly in less desirable fish species – with no sign of “unmeasurable riches.” The long-term costs of attempting to continue increasing the wild fish harvest are projected (e.g., Pauly et al. 1998, Jackson 2008) to be disastrous, and even the popular press is beginning to realize that the future of the oceans is truly at risk (Renton 2008). Only a combination of reduced fishing pressures, a ban on bottom trawling, restoration of fisheries’ coastal “nursery” ecosystems, establishment of large networks of marine reserves, and (probably) stabilization of the climate through great reductions of the flow of CO₂ into the atmosphere (and thus reducing the acidification of the seas) would likely brighten that future.

Similarly, our view of the panacea potential of novel food sources such as single-cell protein from bacteria or algae cultured on petroleum or sewage (e.g., Marx 1989), leaf protein (Pirie 1966), or food production by nuclear agro-industrial complexes (Oak Ridge National Laboratory 1968) has proven entirely correct (pp. 100–105), as has our estimate that high-yield grains held the most hope for increasing human food supplies (pp. 106–107) and our concern about the environmental downsides of what was termed the “Green Revolution” (Dahlberg 1979, Ehrlich and Ehrlich 1990, Ehrlich and Ehrlich 1991).

The book was ahead of its time in its attention to new threats of vast epidemics connected to population size, coming out as it did just as Surgeon General William H. Stewart was declaring that vaccination and antibiotics had conquered infectious diseases. Decades before AIDS began to kill millions of people, we wrote of our concern about the deterioration of the epidemiological environment and the possibility of a “super flu” (pp. 69–71), which are far more serious worries today than they were forty years ago (Daily and Ehrlich 1996a, Daily

and Ehrlich 1996b). And it gave ample attention to the overuse of pesticides, especially DDT, which remains a serious problem, despite knowledge that often, maybe always, integrated pest control is a more economically (Cowan and Gunby 1996) and ecologically rational approach (Ehrlich and Ehrlich 1990, pp. 57–59).

What did *The Bomb* get wrong?

From a personal point of view, the worst aspect of the book was its title, which was taken (with permission) from General William H. Draper, founder of the Population Crisis Committee and a pamphlet issued in 1954 by the Hugh Moore Fund. Draper was, in tune with the tenor of the times and his friendship with George H.W. Bush, most concerned with the control of the populations of dark-skinned people (for an overview of the less savory aspects of population limitation, see Connelly 2008). The publisher’s choice of *The Population Bomb* was perfect from a marketing perspective but it led Paul to be miscategorized as solely focused on human numbers, despite our interest in all the factors affecting the human trajectory.

Perhaps the most serious flaw in *The Bomb* was that it was much too optimistic about the future. When it was written, carbon dioxide was thought to be the only gas whose greenhouse effect might cause serious global heating (the roles of methane, nitrous oxide, and chlorofluorocarbons were not recognized until a decade or so later). When the book was published, some climatologists thought that any warming from carbon dioxide emissions would be counteracted by anthropogenic dust and contrails from high-flying jets, which would have a global cooling effect. As a result, we could only write that exploding human populations were tampering with the energy balance of Earth and that the results globally and locally could be dire. Since *The Bomb* was written, increases in greenhouse gas flows into the atmosphere, a consequence of the near doubling of the human population and the near tripling of global consumption, indicate that the results likely will be catastrophic climate disruption caused by greenhouse heating.

In 1968 Sherwood Rowland and Mario Molina had not yet discovered the potential of chlorofluorocarbons to destroy the ozone layer and make life on Earth’s surface impossible. Norman Myers was years from calling world attention to the destruction of tropical rainforests; when *The Bomb* was written, the possibility that the tropical moist forests of the Amazon basin, Africa, and Asia might be destroyed was essentially unknown.

Also unknown were the threats of endocrine disrupting contaminants (pollutants that mimic hormones), compounds with non-linear dose-response curves that may be more dangerous in trace rather than high concentrations (Myers and Hessler 2007, Narita et al. 2007). Polar bears were not having reproductive difficulties blamed on pollutants then, nor were they losing their habitat due to melting sea ice. And we did not anticipate the largely successful attempts of the Reagan and George W. Bush administrations to roll back environmental regulations, promote over-reproduction globally, and (in the case of Bush) start a resource war over fossil fuels (Klare 2004, Ehrlich and Ehrlich 2005). The first post-World War II resource war was over water – the 1967 Israeli-Arab war. Those two wars may have been precursors of many more resource wars with intimate connections to overpopulation (Klare 2001, Klare 2008).

There were of course flaws in *The Population Bomb's* analysis of known threats. The first lines of the Prologue (p. 11) proved to be among the most troublesome in the book: “The battle to feed all of 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.” We are often asked what happened to the famines *The Bomb* predicted, as if the last four decades were a period of abundant food for all. But, of course, there were famines, essentially continuously in parts of Africa. Perhaps 300 million people overall have died of hunger and hunger-related diseases since 1968. But the famines were smaller than our reading of the agricultural literature (Paddock and Paddock 1964) at the time had led us to anticipate. What happened? The central factor, of course, was the medium-term success of the “green revolution” in expanding food production at a rate beyond what many, if not most, agricultural experts believed likely. As a result, there wasn't a general rise in the death rate from hunger – although there have been periodic regional rises in South Asia and Africa, and the world now may be on the brink of another major rise.

As was suggested in the same paragraph of the Prologue, many lives were saved by “dramatic programs to ‘stretch’ the carrying capacity of the earth by increasing food production.” The success of expansion of India's grain production was far beyond that foreseen by experts such as Raymond Ewell (pp. 39–40) and Louis L. Bean (pp. 40–41). On the other hand, the cautious optimism of Lester Brown (then administrator of the International Agricultural Development Service) was justified for the short term, although Brown has subsequently become much more pessimistic.

The analysis of the food situation in *The Population Bomb* was thus wrong in that it underestimated the impact of the green revolution. At the same time it did recognize that serious ecological risks would accompany the spread of that revolution (p. 108), although missing the overdrafts of groundwater, declines in the genetic variability of crops, and some other problems. It emphasized the importance of both curbing population growth and attempting to expand food production, and it is worth noting that falling population growth rates in the rich nations of Europe have played a significant role in the creation of agricultural surpluses in those countries. Nevertheless, the absolute numbers of “hungry” people by 2005 (around 850 million) were somewhat less than they were in 1968. That was a cheering result, but the numbers of under- and malnourished people may now have risen again by 100 million or more in the current food shortage crisis. Even so, the reduction of the hungry portion of the world population may well have been bought at a high price of environmental destruction to be paid by future generations. It should be noted that in 1968, as today, there was and is enough food to feed everyone an adequate diet if food were distributed according to need. But there is not the slightest sign that humanity is about to distribute anything according to need, and it is uncertain how long there will be enough food for everyone even if there were more equitable distribution.

The Bomb was also somewhat misleading in stating that the birthrate in the United States might soon rise as the post-World War II baby boomers matured into their reproductive years. Instead, it actually dropped significantly in the early 1970s. One interesting question raised by this is how much of that change was the result of rising concern about overpopulation generated in part by *The Bomb* itself. And in 1968 the critical importance for lowering birthrates of providing women with education and job opportunities, as well as access to contraception and abortion, was under recognized, and we did not properly emphasize their potential role in reducing birthrates.

The biggest tactical error in *The Bomb* was the use of scenarios, stories designed to help one think about the future. Although we clearly stated that they were not predictions and that “we can be sure that none of them will come true as stated,” (p. 72) – their failure to occur is often cited as a failure of prediction. In honesty, the scenarios were way off, especially in their timing (we underestimated the resilience of the world system). But they did deal with future issues that people in 1968 should have been thinking about – famines, plagues, water shortages, armed international interventions by

the United States, and nuclear winter (e.g., Ehrlich et al. 1983, Toon et al. 2007) – all events that have occurred or now still threaten. We also didn't realize that many commentators would assume that our analysis in *The Population Bomb* comprised our last thoughts on the subject and would never bother to look at the many hundreds of subsequent articles and books in which we updated and revised our conclusions (e.g., Ehrlich and Holdren 1971, Ehrlich et al. 1977, Ehrlich et al. 1981, Ehrlich and Ehrlich 1981, Ehrlich and Ehrlich 1987, Ehrlich and Ehrlich 1989, Ehrlich and Ehrlich 1990, Ehrlich and Ehrlich 1991, Ehrlich et al. 1992, Ehrlich et al. 1995, Ehrlich and Ehrlich 2005).

Back to fundamentals

The essential point made about population growth is as valid today as it was in 1968: "Basically, there are only two kinds of solutions to the population problem. One is a 'birthrate solution,' in which we find ways to lower the birthrate. The other is a 'death rate solution,' in which ways to raise the death rate – war, famine, pestilence – find us" (p. 34).

The answer to the question of whether future substantial rises in death rates could have been avoided if more comprehensive action to reduce birthrates had been initiated in the late 1960s, will probably never be clear. Those death rate rises seem ever more likely today as hunger wracks millions of poor people and causes food riots (Anonymous 2008) and as the agricultural enterprise in many regions is threatened by massive climate disruption (Fogarty 2008), although the uncertainties are great and are likely to remain so for a substantial period of time. In any case, one only need look at current projections for population shrinkage by mid-century due to AIDS in countries such as Botswana and widespread increases in hunger because of rising food prices (Lean 2008) to realize that if we continue on a business-as-usual course, a full-scale death rate solution may soon be upon us.

Much of the focus of *The Bomb* was on avoiding a collapse of humanity's global civilization from "three of the four apocalyptic horsemen—war, pestilence, and famine" (p. 69). Those horsemen were also doubtless involved in most of the past local and regional collapses of which we are aware – civilizations of Akkadia, Sumeria, Babylonia, Nineveh, Rome, the Classic Maya, Easter Island, Norse Greenland, and so on (e.g., Tainter 1988, Diamond 2005). The same horsemen, joined by a fourth, toxification, represent increasing threats today as globalization destroys the safety valve of modularization and the civilization

facing collapse is for the first time truly global (Ehrlich and Ehrlich 2005, Ehrlich and Ehrlich 2008).

The fundamental point of *The Population Bomb* is still self-evidently correct, we believe: the capacity of Earth to produce food and support people is finite. More and more scholars have realized that as our population, consumption, and technological skills expand, the probability of a vast catastrophe looms steadily larger (Homer-Dixon 2006). James Lovelock "believes global warming is now irreversible, and that nothing can prevent large parts of the planet becoming too hot to inhabit, or sinking underwater, resulting in mass migration, famine and epidemics. Britain is going to become a lifeboat for refugees from mainland Europe, so instead of wasting our time on wind turbines we need to start planning how to survive." Lovelock fears we won't invent the technologies necessary to save us in time and expects "about 80%" of the world's population to be wiped out by 2100." Prophets have been foretelling Armageddon since time began, he says. "But this is the real thing" (Aitkenhead 2008). British astronomer Sir Martin Rees suggests similar possibilities as the title of a recent book indicates: *Our Final Hour: A Scientist's Warning: How Terror, Error, and Environmental Disaster Threaten Humankind's Future In This Century – On Earth and Beyond* (Rees 2003).

Signs of potential collapse, environmental and political, seem to be growing. The pattern is classic – population grows to the limits of current technologies to support it, followed by technological innovation (e.g., long canals in Mesopotamia, green revolution in India, biofuels in Brazil and U.S.) accompanied by more population growth and environmental deterioration, while politicians and elites fail to recognize the basic situation and focus on expanding their own wealth and power.

On the population side, it is clear that avoiding collapse would be a lot easier if humanity could entrain a gradual population decline toward an optimal number. Our group's analysis of what that optimum population size might be like comes up with 1.5 to 2 billion, less than one third of what it is today. We attempted to find a number that would maximize human options – enough people to have large, exciting cities and still maintain substantial tracts of wilderness for the enjoyment of outdoors enthusiasts and hermits (Daily et al. 1994). Even more important would be the ability to maintain sustainable agricultural systems and the crucial life support services from natural ecosystems that humanity is so dependent upon. But too many people, especially those in positions of power, remain blissfully unaware of that dependence.

Conclusions

The Population Bomb certainly had its flaws, which is to be expected. Science never produces certainty. Nonetheless we are all, scientists or not, always attempting to predict the future (will the stock go up or down? Will he be a good husband? Will it rain later?). And when we plan, we do the best we can.

One of our personal strategies has always been to have our work reviewed carefully by other scientists, and *The Population Bomb* was no exception. It was vetted by a series of scientists, including some who became top leaders in the scientific enterprise. That is one reason that long ago the fundamental message of *The Bomb* moved from a somewhat heterodox view to a nearly consensus view of the scientific community. Consider the following two 1993 statements. The first was the World Scientists' Warning to Humanity, released by the Union of Concerned Scientists (1993) and signed by more than 1500 of the world's leading scientists, including more than half of all living Nobel Laureates in science. The second was the joint statement by 58 of academies participating in the Population Summit of the World's Scientific Academies, including the U.S. National Academy of Sciences, the British Royal Society, and the Third World Academy (National Academy of Sciences USA 1993).

The World Scientists' Warning said in part: "Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about."

Part of the Academies' pronouncement read: "the magnitude of the threat... is linked to human population size and resource use per person. Resource use, waste production and environmental degradation are accelerated by population growth. They are further exacerbated by consumption habits.... With current technologies, present levels of consumption by the developed world are likely to lead to serious negative consequences for all countries.... As human numbers further increase, the potential for irreversible changes of far-reaching magnitude also increases."

These statements recognized that humanity has reached a dangerous turning point in its domination of the planet (Ehrlich and Ehrlich 2008), a view even

more common in the scientific community today (e.g., Hall and Day 2009). The same genius that allowed us to achieve that dominance now must be harnessed if we are to prevent our very success from sealing our doom. We think, with all its warts, *The Bomb* did exactly what we had hoped – alerted people to the importance of environmental issues and brought human numbers into the debate on the human future. It was thus a successful tract, and we're proud of it.

Notes

1. See <http://www.listsofbests.com/list/92/>.
2. See <http://www.humanevents.com/article.php?id=7591>.
3. See http://thinkexist.com/quotation/nature_has_color-coded_groups_of_individuals_so/179145.html.
4. See http://seattlepi.nwsource.com/national/1501ap_sci_warming_scientist.html
For a more technical treatment see Hansen et al., 2008
5. Simon was also instigator of bets on the future of the environment. For those interested in this episode a detailed account with references can be found in Ehrlich and Ehrlich (1996), pp. 100–104.
6. See <http://webdiary.com.au/cms/?q=node/2006>.
7. "Of all things in the world, people are the most precious. Under the leadership of the Communist Party, as long as there are people, every kind of miracle can be performed." (*The Bankruptcy of the Idealist Conception of History.*) <http://www.marxists.org/subject/china/peking-review/PR1975-02c.htm>.
8. Who thought the "ultimate resource" was the human mind.
9. Quoted in *Africa Geographic* 15, no. 7 (August 2007): p. 112.
10. All page references in *The Population Bomb* are to the first edition.

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