Demografiction

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If Bertrand Zobrist had consulted a competent demographer, he would not have pursued his purported "solution" to problems of rapid human population growth.

To recall, Zobrist randomly sterilized one-third of the world's people (with no by-your-leave). If this fascist intervention had no effect on the birth rates or death rates of the other two-thirds, what would be the demographic consequences?

Earth had about 7.1 billion people in 2013, so the sterilization would leave about 4.7 billion people unaffected. Since the unaffected people would be a random sample from the population, their numbers would grow at the same rate as the whole population in the absence of sterilization. The rate of growth per year of the world's population is 1.1 percent (United States Census Bureau estimate for 2013) or 1.2 percent (Population Reference Bureau's 2012 World Population Datasheet). Nobody knows the global population growth rate exactly because many countries have no recent demographic data.

If the unsterilized people continued to increase in numbers at 1.2 percent per year (I will return to this implausible assumption in a moment), then these 4.7 billion would grow back to 7.1 billion people by the year 2047. The growth rate of 1.1 percent per year brings the population produced by the unsterilized 4.7 billion to 7.1 billion people by the year 2050, only three years later.

Zobrist's "solution" is no solution at all, only a temporary delay, if it results in no change in the birth rates or death rates of the unsterilized.

Now let's go back to my "implausible assumption" of a fixed annual percentage of increase per year. (Whether it's 1.1 percent or 1.2 percent doesn't matter.) This assumption is the definition of exponential population growth: a constant annual percentage of increase. (Think of the size of the population as the value of a bank account that grows at a fixed interest rate.) Zobrist assumes exponential growth when he lectures Dr. Elizabeth Sinskey:

> "The time bomb is no longer ticking. It has already gone off, and without drastic measures, exponential mathematics will become your new God ... and 'He' is a vengeful God. He will bring to you Dante's vision of hell right outside on Park Avenue ... huddled masses wallowing in their own excrement. A global culling orchestrated by Nature herself."

In fact, contrary to the assumption of Thomas Robert Malthus in 1798 and many neo-Malthusians since then, human numbers globally have hardly ever grown exponentially. For most of human history up to the early 1960s, despite major fluctuations like the Black Death, the annual percentage of increase of the global population was itself increasing. Demographers say that global population growth was super-exponential. (Think of a bank account in which the interest rate rises in proportion to the balance accumulating in the account. If you find such a bank account, I want to know about it.)

Super-exponential population growth ended dramatically in the early 1960s, though no one knew it at the time, when many people in developing countries began having fewer children. The Census Bureau estimates that the all-time high growth rate of global human population, just over 2.22 percent per year, was reached in 1963. The annual rate of increase then fell by more than half, to 1.09 percent per year in 2013, just fifty years. The growth rate of the human population has been anything but constant. It has been falling dramatically for the last half-century.

"It is difficult to predict, especially the future," goes a standard joke among demographers. The Census Bureau projects that the world's population will be growing by 0.47 percent per year by 2049. This rate of increase is less than half the current growth rate. In the low variant projection of the United Nations Population Division published in 2012, global population growth ends altogether by the middle of the twenty-first century and a slow decline begins, with no help whatsoever from Bertrand Zobrist.

The recent and projected slowing of global population growth is good news. But it is far from the whole story. About one-sixth of humankind, mainly in the least developed countries, still suffers exceptionally high population growth rates. Authoritarian interventions like those of Zobrist are no more appropriate for these unfortunate regions than for the world as a whole. The multifaceted strategies that respect individual human dignity and improve human well-being while lowering population growth rates include education for all boys and girls; improvements in the status of women through legal rights, credit, and employment opportunities; raising the age of marriage; reproductive healthcare and family planning; reductions in the death rates of children (so that parents feel less need to bear many children as old-age insurance); economic development; and modernization in all its variety and imperfection.

In this work of what the Dutch demographer Anton Kuijsten called "demografiction," Zobrist's central and fundamental error is his assumption that human numbers are the major or sole threat to the future well-being of humans and life on Earth. On the contrary, for example, from 1900 to 2008, carbon emissions from fossil fuels increased sixteen-fold globally. Over this same interval, global human population increased roughly 4-fold (3.8-fold or 4.3-fold, depending on the estimate of global population in 1900). Thus carbon emissions per person roughly quadrupled. More recently, between 1990 and 2008, carbon emissions from fossil fuels increased by about 50 percent while global population size grew

about 27 percent. The increases in emissions per person are at least as much of a threat to the stability of the atmosphere and Earth's climate as the increases in the number of people.

While today's rich countries were the main emitters of carbon dioxide in the past, now the responsibility for carbon dioxide emissions is shared between rich and poor countries. Beyond sheer numbers of people, how people choose to live and make their livings, and what they value in their own lives and in the lives of their descendants, determine their own, and their descendants', well-being.

Zobrist, smiling confidently, tells Dr. Sinskey: "Any environmental biologist or statistician will tell you that humankind's best chance of long-term survival occurs with a global population of around four billion." It sounds pretty authoritative, doesn't it? Not so fast. I reviewed estimates by reputable scientists and scholars of Earth's human carrying capacity in my 1995 book, *How Many People Can the Earth Support?* Twentieth century estimates of the human population ceiling ranged from fewer than one billion to more than 1000 billion. Another study by Jeroen C. J. M. van Den Bergh and Piet Rietveld in 2004 found a similar wide range of estimates of Earth's human carrying capacity.

These estimates of human carrying capacity range so widely because they rest on widely divergent assumptions. No single number for global population can possibly tell you where humankind's best chance of long-term survival occurs. Human carrying capacity depends in part on how people, alive now and yet to be born, answer a host of questions that range far beyond demography.

What political institutions will resolve conflicting interests, allocate power, and establish law? Will people settle their political differences by contaminating large regions of Earth with radioactive fallout or by negotiating peacefully? What technologies will people use? Will people grow their food and fiber by mining aquifers, eroding top soils, exhausting the forests, and depleting the oceans, or by protecting the fresh waters, lands, woods, and seas that nurture us and other species? What average level of material well-being and what distribution, with how much inequality,

will people desire or accept? What economic arrangements will regulate production, distribution, exchange, and consumption? What demographic institutions and policies will influence families, child-bearing and child-rearing, care of the elderly, migration, and urban life? What physical, chemical, and biological environments will people prefer or find acceptable? Parks or parking lots? Jaguars with four wheels or jaguars with four legs? Will people want a world that is livable and beautiful for five years or five thousand years or five million years? What level of variability and risk will people accept (environmental, economic, and political)? What values, tastes, and fashions will govern human behavior? Will we return to the Easter Islanders' taste for colossal *mo'ai* or Aztec human sacrifice? Will we continue to permit people who are poor or unemployed to go hungry? Will people continue to poison themselves with tobacco, excessive alcohol, and addictive drugs? Answers to all of these questions influence how many people Earth can support.

In addition to these largely unpredictable human choices, we understand very incompletely the constraints that the natural world imposes. How much we invest in understanding the natural world will also influence Earth's human carrying capacity, because our knowledge will influence how we use and accommodate ourselves to Earth.

Had Zobrist really wanted to make the world a better, more secure home for humans and other species, he might have attended to the quality of the process of bringing about change as well as to his goal. Those billions of people Zobrist sterilized, and the billions more in the families they belonged to, had no voice in the change imposed on them. Neither did the many tens of millions who died in the twentieth century at the hands of Hitler, Stalin, and Mao. "Father Knows Best," a popular network radio and television show from 1954 to 1960, is dated as comedy and obsolete as a strategy of governance. Consulting with people who are affected by potential change improves human well-being by granting people the dignity of having a voice in the processes of decision and change. Who knows? It could improve the outcome of change as well.

2013

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