

Disaster Watch

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Global Catastrophes and Trends: The Next Fifty Years

by Vaclav Smil.
MIT Press, 307 pp., \$29.95

Under the ominous title *Global Catastrophes and Trends: The Next Fifty Years*, Vaclav Smil, a versatile geographer at the University of Manitoba, provides a broad, factual vision of the “major factors that will shape the global future [to 2050] and... their probabilities and potential impacts.” He warns the reader not to “expect any grand forecasts or prescriptions, any deliberate support for euphoric or catastrophic views of the future, any sermons or ideologically slanted arguments.” He promises that we should

instead, expect eclectic inquiries, reliance on long-term historical perspectives, reminders that limited understanding and inherent uncertainties are our constant companions in appraising the risks of globally fatal discontinuities and the strength and ultimate outcomes of unfolding trends.

On the whole, he fulfills this promise. On the way, he delights the reader with little-known and unexpected facts. Of course, it is hard for a man to smell his own breath and, as will be seen, he also makes some questionable claims.

Smil thinks societies change by bumps and grinds, although he does not use those words. Bumps are events of short duration and low probability with a global, transforming impact, as when an asteroid hit the earth 65 million years ago. Grinds, such as global warming, are “persistent, gradually unfolding trends that have no less far-reaching impacts in the long term.” Smil recognizes that this simple dichotomy is inadequate to capture all reality, and illustrates the continuum between bumps and grinds by major transitions in demography, energy, and the environment. Such changes—as, for example, the spread of antibiotic resistance in bacteria—typically stretch over at least a few decades, a long time on the scale of an earthquake but a short time for the reshaping of world history. Smil tries to calculate the odds of major risks and to evaluate trends using statistical data but, based on historical examples, concludes that “the only reliable forecast [is] our inability to forecast.”

Smil defines catastrophes as disasters that occur in minutes to months, have profound global, hemispheric, or large-scale regional impacts on world history, and occur at least every million years. The only natural physical events that meet Smil’s criteria are collisions between Earth and large extraterrestrial objects, massive volcanic eruptions, and tsunami-generating slides of volcanoes into the ocean. He gives fascinating quantitative and historical estimates for each of these.

As the recent outbreak of swine flu ominously reminds us, biology adds influenza to this short list of horrors. On June 21, 2009, when swine flu had reached seventy-four countries,

infected nearly 29,000 people, and killed 144 people, the World Health Organization declared swine flu to be pandemic, the first global flu epidemic in forty-one years. Before this epidemic began, Smil wrote:

The likelihood of another influenza pandemic during the next 50 years is virtually 100 percent, but quantifying probabilities of mild, moderate, or severe events remains largely a matter of speculation because we simply do not know how pathogenic a new virus will be and



David Doubilet/National Geographic Stock

what age categories it will preferentially attack.

Among violent conflicts, Smil concentrates on what he calls transformational wars: the Napoleonic Wars (1796–1815), the Taiping War (1851–1864), the American Civil War, World War I, and World War II. These wars added up to some forty-two years of conflict over two centuries and averaged seventeen million deaths of combatants and civilians per conflict. Smil estimates the probability of a transformational war during the next fifty years at “no less than about 15 percent and most likely around 20 percent.” These estimates are ten to a hundred times higher than the probabilities of globally destructive natural catastrophes. As Pogo said, the enemy is us.

Of terrorist attacks, Smil writes: “Only a single conclusion can be reached with certainty, namely, that the oft-repeated post-2001 aspiration to eliminate terrorism (‘winning the war on terror’) is unachievable.” The risk to Americans from terrorist attacks and military responses to them, including all US military casualties in Afghanistan and Iraq and related noncombat deaths, is, Smil estimates, about ten times less than the risk of dying from homicide and a thousand times less than the risk of fatal car accidents averaged between 1991 and 2005. “During the first five years of the twenty-first century, the US highway death toll exceeded the 9/11 fatalities every single month.”

Globally, between 1970 and 2005, fatalities caused by terrorist attacks averaged below a thousand a year, not

much greater than airline accidents and volcanic eruptions, but far fewer than deaths from floods and earthquakes, which were in turn far fewer than fatalities from car accidents and medical errors, which Smil estimates as causing several hundred thousand deaths each year. He does not mention that tobacco use kills five to six million people a year globally, more than twice as many as HIV/AIDS, three times as many as tuberculosis, which accounts for about two million deaths a year, and five or six times as many as malaria, which causes some one million deaths

a year. Doesn’t smoking tobacco pose a far greater threat than al-Qaeda?

Smil’s recommendations for dealing with terrorism are puzzling: “Anti-terrorism strategy should be framed not as a war but as a repressive action against a cellular, secretive, networked, violent organization.” While I agree that anti-terrorism strategy should not be framed as a war, the target is not a single organization, as he suggests, but a shifting array of shadowy organizations that emerge and disappear.

Turning from bumps to grinds, Smil focuses on unfolding trends in energy and what he calls the new world order. In 2005, the world’s total power consumption was about fifteen terawatts. (A terawatt is a million million watts.) Of this total, nearly 87 percent, or about thirteen terawatts, originated from fossil fuels. For comparison, an average person generates roughly the same amount of power as a 100-watt bulb, so the 6.5 billion people alive in 2005 generated about 0.65 terawatt. On average, in 2005 each person’s power was amplified twentyfold by fossil fuels and another threefold by power from other sources.

The transition to nonfossil energy will be difficult, Smil argues, because of the enormous scale of the change required, the lower power of the replacement fuels compared to oil, and the intermittence and uneven spatial distribution of renewable energy sources. Among the renewable sources of energy, only solar energy could conceivably be

converted to a flow of electricity that is considerably larger than the current total primary energy supply. Whether such conversion would be practical is intensely debated. The technically feasible maximum energy that could be derived globally from ocean currents, tides, geothermal sources, stream runoff, and wind, Smil estimates, is less than ten terawatts. Of these, the largest potential supplier is wind energy.

Today, a return to dependence on plant matter—such as burning wood, charcoal, and dried manure—that dominated human energy consumption until the end of the nineteenth century is not in the cards: “Recent proposals of massive biomass energy schemes are among the most regrettable examples of wishful thinking and ignorance.” For instance, if the United States transportation sector were to run on ethanol produced from corn at 2005 rates, it would require roughly three quarters of the country’s farmland.

Among alternative energy sources, Smil favors “aggressively pushing nuclear electricity generation.” He concedes that nuclear power lacks both public acceptance and a way to dispose of the spent fuel durably and safely. He gives little attention to the risk of exploiting nuclear plants as terrorist targets or as sources of weapons-grade nuclear materials.

The adoption of new forms of energy will differ, Smil argues, from the earlier transition from plant matter to fossil fuels, which was driven by the disappearance of forests, the advantages of fossil fuels in energy density, storage, and flexibility of use, and the lower costs of hydrocarbons and coal. For the future, while oil is getting more expensive, coal remains abundant and cheap, and the new energy sources are unlikely to be either cheaper or easier to use, though they may produce far smaller quantities of greenhouse gases.

About climate change, Smil is equivocal. He acknowledges the potentially far-reaching consequences of global warming, and warns that “continued large-scale combustion of fossil fuels could increase atmospheric CO₂ to levels unseen since large herds of horses and camels grazed on grassy plains of America.” He also writes that “no country will be immune to global climate change, and no military capability, economic productivity, or orthodox religiosity can provide protection against its varied consequences.” But he suggests that “this preoccupation with CO₂ misses nearly half of the problem,” because other kinds of greenhouse gases, such as methane (which is emitted by livestock, natural gas, and organic decay), have more potent greenhouse effects, even if they are less abundant. And he is critical of predictions about global warming derived from complex models of climate behavior, which he considers “elaborate speculations”:

In order to forecast the additional warming that might take place by the year 2050 we must rely on a set

of highly uncertain assumptions. We do not know... the future rates of fossil fuel combustion, land use changes, fertilizer use, and meat production. They will depend on the continuing increases of energy use, the extent of discoveries of new hydrocarbon deposits, the rates of penetration of nonfossil energy conversions, national land use policies, disposable incomes, and the overall vitality of the global economy.

Perhaps as a consequence, Smil sees climate change as one of "many other worrisome large-scale environmental changes," and does not discuss the possible catastrophes about which some climate scientists have warned.¹

In addition to climate change, Smil's two big unknowns are how much the influence of Islam will continue to grow and how far inequality in income and wealth within and between nations will increase. I will consider here only the influence of Islam. Smil argues against the plausibility of a centrally governed Islamic caliphate from Morocco to Pakistan:

Because the Muslim world is too heterogeneous (in sectarian, economic, cultural, and political ways), the chances of seeing such an extensive, coherent, and globally powerful political and economic entity before 2050 are vanishingly small.... The problem is not Islam,

¹See Bill McKibben's review of Nicholas Stern's *The Global Deal*, *The New York Review*, June 11, 2009.

a religion with tenets as contradictory, as open to diverse interpretation, and as confusing in its totality as are its two great monotheistic inspirations, Judaism and Christianity. The problem is political or politicized Islam, Islam tendentiously interpreted, or not interpreted at all and hence stubbornly anchored in its medieval origins.

Smil thinks the Muslim world is barred from greater global influence by its late and insufficient demographic transition from high birth rates and death rates to low birth rates and low death rates. This problem, he suggests, has led in many Muslim countries to rapidly growing populations with a high proportion of young people to educate and employ. On the other hand Smil also thinks Europe as a whole is barred from being a great power by its early and overextended demographic transition to low birth and death rates. Does greatness require a demographic transition like porridge for the three bears, not too cold and not too hot?

In my view, a society's demographic situation is both a consequence of, and an influence on, the economic, cultural, and environmental factors that, together with demography, jointly determine the society's capacity and well-being. If Europe is challenged by the aging and decline of its native-born population, it is equally challenged by its slowness or reluctance to integrate its African, Asian, and Middle Eastern immigrants. If some Muslim countries are threatened by enormously high fertility and population growth, it is not because they are Muslim.

Smil's factual errors here are baffling. He writes:

At the beginning of the twenty-first century the only countries with Muslim majorities whose total fertility was near replacement level were Iran, Indonesia, and Malaysia. In all populous Muslim countries of North Africa and the Middle East, as well as in Pakistan and Bangladesh, total fertility was 50 percent–100 percent above replacement.

But Malaysia's total birth rate of 2.9 children per woman² in 2000–2005 (above the global average of 2.6 or 2.7 children) hardly qualifies it as having low fertility. Smil also fails to include among these exceptions Turkey, with only 2.2 children per woman, and Tunisia, with 2.0 children per woman (below replacement level). Perhaps Lebanon, with four million people, is too small to qualify as "populous," but its total fertility rate of 2.3 is also approaching replacement.

Iran's total fertility rate, which had remained flat at 7.0 children per woman between 1950 and 1965, fell to 2.1 children per woman for the years 2000 to 2005. The fraction of Iranian women aged 15–49 who were literate rose from 15 percent in 1966 to 65 percent in 1991.³ In the Syrian Arab Republic, total fertility fell from 7.3 children per woman between 1950 and 1955 to under 3.5 children per woman between 2000 and 2005. Most of the decline happened in recent decades, following a dramatic rise in the literacy of Syrian women from 15 percent in 1960 to 62 percent in 1990. What Smil calls Islam's "tardy demographic transition" is not a problem specific to Islam, but a problem of tardy development.

Questioning Europe's possibilities for future global dominance, Smil observes that Western Europe's share of the world's economic product declined from 34 percent in 1900 to a little over 20 percent in 2000. The prospects, in his view, are only for further decline in relative economic power as Europe's population continues to shrink and age. Smil (following the demographer Paul Demeny) argues soundly that Europe faces a great challenge over the next half-century. In 2005, for every ten people in the twenty-five countries of the European Union (EU-25), there were fourteen people in the surrounding Muslim countries. By 2050, for every ten people in the EU-25, there will be, according to medium projections, nearly twenty-eight people in the surrounding Muslim countries. Even with net immigration of more than 35 million people between now and 2050, the EU-25 is projected to lose perhaps 10 million people and to reach 450 million while the population of its southern and southeastern neighbors will grow to perhaps 1.25 billion.

²This and the following total fertility rates are from the United Nations Population Division's "World Population Prospects: The 2006 Revision," available at esa.un.org/unpp/index.asp?panel=2.

³Marie Ladièr-Fouladi, "The Fertility Transition in Iran," in *Population: An English Selection* (Paris: Institut National d'Études Démographiques, 1997), Vol. 9, pp. 191–213.

Smil approaches the "new world order" by asking which nation will be "on top." He expects that "two key trends, China's rise and US retreat, will continue during the coming generation." But the outcome is unclear.

China's vulnerabilities and liabilities include an autocratic government, frequently unreliable statistics, too few girl children, too many unattached young men, rapid aging as a result of the country's one-child policy, inadequate pension plans, growing inequality, environmental degradation, very limited agricultural land (just over 0.1 hectare per person, compared with 0.5 hectare per person in wealthy Western nations), dependence on other nations for grain and meat, water shortages, excessive sulfur and nitrogen oxide emissions, environmentally disastrous hydroelectric projects, and a lack of fresh ideas to support the power of the ruling party.

Smil declares his admiration for the United States. Nonetheless, he is unequivocal in his assessment that "its slide from global dominance has been under way for some time," and that "many components of this complex process have become much more prominent..." He points to the limits of US military power in Korea, Vietnam, Somalia, and Iraq, and the country's inability to control immigration. He cites America's rising budget deficit—which is likely to increase much further in the current economic crisis—and worsening current account balance, as well as its dependence on imports for industrial supplies and materials, energy, capital goods, and mundane manufactures. The United States' share of the world's economic product dropped from 35 percent in 1945 to just 20 percent in 2005 (still, US population in 2005 was only one twenty-fifth, or 4 percent, of the world's).

Smil has much to say about America's internal demographic, social, and behavioral problems. Its population is aging, though less than the populations of Europe and Japan. Not enough young Americans will be able to buy the stock and real estate assets, at their peak valuations, of the rich baby boomers, who are now retiring. An increasing fraction of those assets will end up in the hands of non-Western investors by mid-century. In 2003, the mathematical skills of American fifteen-year-olds ranked lower than those of all other OECD nations except Portugal, Greece, Turkey, and Mexico. Physical fitness has been declining while obesity has been rising. "It is very clear," at least to Smil, "that [the US] is living on borrowed time and yet has no imminent intentions to do otherwise." If the United States were forced to live within its means it would be "a very different place." "US global leadership is in its twilight phase."

Smil assumes that

who is on top matters—be it as savior, hegemon, pacesetter, model, irresistible attractor, or brutal enforcer. The United States may have been one or the other of these to different nations at different times, but its retreat from such roles will not create a more stable world, particularly if there is no clearly dominant power or grand alliance.... Conditions in the absence of a global leader in a world swept by the forces of globalization would

resemble those following the retreat of Roman power...: chaotic, long-lasting fragmentation, inimical to economic progress, which would greatly exacerbate many of today's worrisome social and environmental trends.

But Smil, on the contrary, emphasizes that states have become increasingly interdependent and increasingly reliant

on more distant and more diverse sources of energy, raw materials, food, and manufactured products and on increasingly universal systems of communication and information processing. No country can now escape this imperative, and as this process advances, it will become impossible for any nation—no matter how technically adept or how militarily strong—to claim a commanding place on top.

If this is so, and I believe it is, then no nation will be uniquely "on top" in Smil's sense and one wonders why he is so concerned about which nation, if any, will take the lead. In my view, not having a nation on top will be an improvement because dominance by force will have to be replaced by negotiation and exchange based on comparative advantage.

Smil is contemptuous of "irreconcilable expert appraisals"—when, in the absence of reliable information, specialists hold directly opposing views—considering that there is "plenty of historical evidence to demonstrate...

their repeated failure to portray the complexity of future natural and human affairs." By contrast, Smil thinks well of himself, and tells you why: his Czech origin, his ability to read all principal European languages, his study of Chinese and Japanese, his five years of work on literary Arabic dialect and the Egyptian dialect, his living in the United States and Canada, and his frequent visits to Asia. He shows off his linguistic skills by starting each chapter with an epigram in Latin (also translated into English). At one point he quotes a saying in Chinese characters and does not translate it. In challenging enthusiastic appraisals of the future of Europe, he writes modestly:

A perspective offered by the author, a skeptical European who understands the continent's major languages, who has lived and earned money on other continents, and who has studied other societies should provide a more realistic appraisal.

Smil concludes, as he has in previous books and articles, by

arguing that we should act as risk minimizers, as no-regrets decision makers who justify our actions by benefits that would accrue even if the original risk assessments were partial[,] or even complete, failures.

He thinks the preoccupation with terrorism should not blind us to more likely threats over the next fifty years:

a "mega-war" and one or two pandemics such as influenza. If we consider the enormous suffering caused by the present forms of HIV, a more infectious and virulent variant of HIV would be another pandemic viral disaster. At one point Smil writes:

Preventive, preparatory, or mitigating actions are called for in order to avoid extreme consequences of unmanaged outcomes, whether a viral pandemic, global warming, or the use of weapons of mass destruction by terrorists.

Nine pages later he writes: "There is simply no way to prepare for a terrorist attack with hijacked nuclear-tipped missiles that could produce tens of millions of instant fatalities, or for a highly virulent pandemic that would produce more than 100 million deaths." Can we prepare adequately for such threats, or can't we? Smil hesitates: "I have been deliberately agnostic about the civilization's fortunes in this survey."

Is there value, then, in this and the many other equally uncertain exercises in futurology?⁴ Yes, if they motivate and guide us to prepare for an inherently uncertain future. No, if they distract us with images of future problems when today's problems are so horrendous. In Central Africa, for example, 55 percent of people are undernourished.⁵ In today's world of 6.7 billion people, roughly one person in seven is chronically hungry. Two billion people or more suffer from micronutrient malnutrition. Nearly one child in three in developing countries is stunted, and those are the survivors. Yet the world currently grows enough food to feed all people an adequate diet.⁶ Meanwhile extraordinary resources are spent preparing and executing organized violence: world military expenditures in 2006 exceeded \$1.2 trillion in current dollars.⁷ Today's

⁴Smil's book is the third attempt I have seen during the last year to classify, quantify, and interpret the major risks of the coming years. The World Economic Forum's *Global Risks 2008* discussed global financial risks, food prices and reserves, disruptions of supply chains, and energy supply and security; see www.weforum.org/pdf/globalrisk/report2008.pdf. The UK National Risk Register summarized "the most significant emergencies" (accidents, natural events, and malicious attacks) potentially facing UK citizens over the next five years; see www.cabinetoffice.gov.uk/reports/national_risk_register.aspx.

⁵See "Causing Hunger: An Overview of the Food Crisis in Africa," Oxfam Briefing Paper 91 (2006), p. 1; available at www.cfr.org/publication/11625/oxfam.html.

⁶Food and Agriculture Organization, International Fund for Agricultural Development, World Food Program, "Reducing Poverty and Hunger: The Critical Role of Financing for Food, Agriculture and Rural Development," prepared for the International Conference on Financing for Development, Monterrey, Mexico, March 18–22, 2002, available at www.fao.org/docrep/003/y6265e/y6265e00.htm. See also Food and Agriculture Organization, *Food Outlook: Global Market Analysis*, November 2008, p. 1, available at www.fao.org/docrep/011/ai474e/ai474e00.htm.

⁷SIPRI Yearbook 2007: *Armaments, Disarmament and International Security*

global catastrophe is several billion people's forgone health, talent, and dignity: the costs in lost opportunities are incalculable.

Concentrating on global catastrophes and debatable long-term trends, Smil attends too little to the different trends that offer promise for the future, such as trends in education, conservation, information technology, and biotechnology. In the twentieth century, primary education spread from being the privilege of few children in wealthy countries to the achievement of most children around the globe (though notable gaps remain). Universal secondary education of good quality could be realized at acceptable cost by 2050,⁸ with enormous benefits to individuals and societies.⁹

Conservation of species and natural areas spread widely from the founding of the world's first national park—Yellowstone—in 1872 to the 1982 meeting of the World Congress on National Parks, which recommended that at least 10 percent of a nation's land be conserved as protected areas.¹⁰ This target or its equivalent was adopted in 1987 by the United Nations World Commission on Environment and Development and by some conservation organizations. Smil points out that the cost of such protection is affordable, while the threat of global climate change adds another practical reason to conserve forests.

Twentieth-century information technologies—including radio, television, computers, cell phones, and broadband networks of cables and satellites—can, in the twenty-first, increase global consciousness of those who are starving and victims of violence. The same technologies can promote education and environmental monitoring, and reduce the amount of materials used to satisfy human wants. Biotechnology of the twentieth century, including the discovery of the chromosomal basis of genetics, DNA, RNA, and proteins, the inventions of antibiotics, vaccines, and contraceptives, and the creation of powerful technologies for rapid DNA typing, among others, could be the prelude to improved human health and better recognition of the diversity of other species and their importance to human health and well-being.

These trends have the capacity and likelihood to transform world history as much as the catastrophes and sometimes questionable trends Smil identifies. This view is no automatic optimism. The positive trends will not be realized unless we love, feed, educate, employ, and protect today's people, especially the young. □

rity (Oxford University Press/Stockholm International Peace Research Institute, 2007), available at yearbook2007.sipri.org/chap8.

⁸Joel E. Cohen and David E. Bloom, "Cultivating Minds," *Finance and Development*, Vol. 42, No. 2 (June 2005), available at www.imf.org/external/pubs/ft/fandd/2005/06/cohen.htm.

⁹Joel E. Cohen, "Make Secondary Education Universal," *Nature*, December 4, 2008.

¹⁰M. A. Sanjayan and M. E. Soule, "Moving Beyond Brundtland: The Conservation Value of British Columbia's 12 Percent Protected Area Strategy" (Greenpeace, 1997), available at archive.greenpeace.org/comms/97/forest/soule.html.