



# Book Global Catastrophes and Trends

## The Next Fifty Years

Vaclav Smil  
MIT Press, 2008  
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## Recommendation

Predicting the future is still impossible, but science has gotten much better at forecasting it, at least to the extent that it is informed by statistics and probabilities. Vaclav Smil speaks the truth as he sees it, according to mathematical information and indications. For instance, he refutes the “peak oil” scenario, but asserts that society’s transition to an economy that is less reliant on fossil fuel is long overdue, environmentally and politically. Smil predicted the financial meltdown and the flu pandemic, so clearly he’s onto something. He delves into a variety of issues in this analysis of trends and calamities, from the economic decline of the U.S. to conflicts in Muslim countries, the aging of many national populations and the depletion of essential ecosystems. *BooksInShort* recommends this fascinating account of the future as seen through the cold eye of a statistician.

## Take-Aways

- Occurrences that can change human history happen either as sudden catastrophes or as trends that unfold over time.
- Science can quantify the probability of some catastrophes, like volcanic super-eruptions, but not others, like nuclear war.
- Statistical analysis of the likelihood of future problems can guide resource use.
- Global pandemic is certain to occur within the next 50 years.
- Terrorist violence could change the world, but how it will occur is unpredictable.
- The aging of populations in Europe, Russia, China, Japan and the U.S. is a long-term trend with a significant international economic impact.
- As U.S. global dominance recedes, no evident power has yet emerged to replace it.
- If globalization’s benefits are fairly distributed, it can help harmonize nations.
- Human interference in the water and nitrogen cycles will affect the Earth as profoundly as human interference in the carbon cycle.
- Overuse of antibiotics accelerates the natural resistance cycle for bacteria, blunting medicine’s ability to stop infection, already the second most common cause of death.

## Summary

### Catastrophes and Epidemics

Occurrences that change human history can happen as sudden disasters or as slow trends, which are more reliably predictable. Think of catastrophes as “fatal discontinuities,” from unforeseeable natural events (volcanoes, tsunamis, pandemics) to conceivable human events, like nuclear war.

“As far as unpredictable discontinuities are concerned...we remain highly vulnerable to another episode of viral pandemic.”

For example, the events of September 11, 2001, demonstrated that “asymmetrical violence” inflicted on many people by a few could transform the world. Even if society can eliminate current identifiable terror threats, more terrorist organizations and causes would emerge. How such groups might attack is unpredictable. While threat of nuclear war between superpowers has decreased, the number of countries with nuclear capacity has increased, as have the chances of a terrorist group acquiring nuclear material. The most horrific “imaginable surprise” would be the deployment, even accidentally, of nuclear weapons.

“Conditions in the absence of a global leader...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.”

The probability of a “transformational war,” a violent conflict that would change the global political order, is statistically predictable. Since a conservative accounting of such conflicts shows 42 years of war in the past 200 years, the likelihood of a conflict in the next 50 years is some 20%.

“Rational attitudes should inform our deliberate decisions. What we get instead are increasingly splintered approaches to major challenges.”

Evidence of dramatic, precipitous climate change in the Earth’s past means science cannot rule out the possibility of rapid change in the future, whether warming or cooling. Other imaginable but incalculable risks include the impact of an unidentified but deadly pathogen or mutated micro-organism. In terms of threats from known diseases, the still-deadly Ebola, malaria and HIV/AIDS viruses do not pose as serious a mass threat to human life as the influenza virus. The 1918 to 1919 influenza pandemic killed more people than World War I. History records regular pandemics, creating a 100% chance of a serious global outbreak in the next 50 years.

## Trends Place by Place

Ongoing demographic and political trends have diverse effects in various regions:

- **China** – Foreign investment in China was \$60 billion in 2005. With mass migration to urban centers, China has developed a large, successful export and manufacturing sector, which is harming U.S. and EU manufacturers. Today, more than 90% of Wal-Mart’s goods are made in China. Demographers estimate that China will be able to match the U.S. on defense spending by 2020; the Pentagon says 2025. Thus China will become an unequivocal global superpower. In the Cold War era, the U.S. did not rely on the U.S.S.R., but today it is growing ever more dependent on China. Some see no problem in expanding trade or in the U.S.’s growing debt to China. Other analysts fear a potentially devastating armed conflict in the Pacific. Several trends may undermine China’s growth to superpower status in the next half-century. The one-child policy, which has kept the population growing but not exploding, also has resulted in a disproportionate number of boys. This has already led to the selling of rural girls to urban bachelors. China’s environment is severely degraded and its diet is insufficiently nutritious. China doesn’t have enough farmland under cultivation to feed its anticipated population and the global market may not have enough surplus food for it to buy. Finally, China is still a closed society that does not inspire the world with either bold innovations or breathtaking art.
- **Europe** – No matter how large the EU grows, Europe, with its burgeoning immigrant base, aging populations, decreasing fertility and dwindling economic production will likely never again be the global power it was in the 1900s. Europe’s reliance on a shrinking population of young people to support a growing number of retirees will exacerbate its problems. People from Muslim countries are Europe’s dominant immigrants. Ultimately, they will either assimilate, or keep expanding, in which case they will demand to live by their religion’s rules, including Shariah law, with its severe limitations on women. European tourism, however, is likely to keep increasing.
- **Japan** – The country’s GDP is again rising and it seems to have arrested deflation, but Japan will probably not regain economic prominence due to its historical and cultural inflexibility, and its increasingly hostile relationships with China, South Korea and North Korea. Japan also has an aging population and a fertility rate below the replacement level. By 2050, it will be the first nation with fewer children than people aged 80 and older.
- **India** – Despite many positives, India is not well-poised to emerge as a global superpower. It has serious social, environmental and economic issues. High illiteracy, low foreign investment, environmental degradation, widespread poverty and ill health all will play a part in keeping India from becoming the dominant world power.
- **Muslim nations** – Even given Islam’s geographic reach, the Muslim world is politically fragmented. An internal conflict divides “fundamentalists” who have politicized the religion from would-be reformers who feel Islam has a compassionate bedrock. Muslim countries’ lack of strong secular governments means this divide will take time to manifest. Meanwhile the spread of Shariah law is precluding the emergence of democracy. Shariah’s lack of modernization and its disdain for education perpetuate cycles of poverty and sectarianism. Demographers expect the Islamic populations of the Middle East and the Arab states to double by 2050. By 2025, one in every seven people in Muslim countries (one in every 16 in Europe) will be an unmarried male in his early twenties or slightly younger, a demographic group that historically has been “assertive” and responsible for violent conflict. This trend argues for political changes in Muslim countries, particularly since the world relies on Saudi Arabia and Iran for oil, Pakistan is already a nuclear state and Iran seems on track to become one.
- **Russia** – This nation’s future prospects look good because of its abundant energy resources. Russia’s natural gas reserves are 10 times larger than U.S. reserves. Russia, which is reasserting itself politically, continues to value and invest in scientific innovation. Unfortunately, its new wealth is not improving its people’s quality of life. Russians do not have long life expectancies, and the country’s population is aging. No other nation’s population will shrink so precipitously over the next 50 years.
- **The United States** – Many historians believe the era of relatively peaceful U.S. global domination is over. The U.S.’s ability to project its hegemony militarily is clearly limited. U.S. growing foreign debt – \$8 trillion in 2005 – undermines its economic might. While some analysts believe this portends economic collapse, others say it is nothing to worry about in a global financial system. While the debt may be cut or even eliminated, the U.S. trade deficit is more worrisome. The U.S. population is aging, and deficiencies in the healthcare and pension systems may lead to bankruptcy. The U.S. relies increasingly on other countries for such basics as industrial inputs and energy. Its reliance on despotic nations for oil is particularly troubling. The total U.S. energy trade deficit in 2005 was \$265 billion. If such trends continue, the U.S. one day may even borrow money to feed itself. Moving to a service-based economy will not help. This trend points the U.S. toward dollar devaluation. Its smaller subset of prosperous people will not be able to pay current prices for its stocks and assets. U.S. education trails the industrialized world. While personal consumption rates are high, the country underfunds basic societal supports, like pensions. To reverse its retreat, the U.S. needs new policies, more frugal lifestyles and a fresh urgency about protecting the rights of future generations.

“Given the enormous amount of money...now pouring into U.S. research on anthrax and smallpox...the work on common pathogens that annually claim millions of lives...is already being shortchanged.”

A world without a superpower will become increasingly unstable and fragmented. Who will respond to emergencies and disasters? Balkanization could enhance the dangerous potential of fringe political agents. Globalization, nations' increasing economic interdependence, should increase stability, but only where its benefits are justly distributed. Household incomes and the distribution of wealth within and among nations show little change in 50 years. Western nations' per capita GDP has grown while per capita GDP in Africa and Asia has been declining. The middle class is shrinking; even within the great economies – U.S., Japan, China, Russia – the gap between rich and poor has been growing.

## Global Environmental Issues

The world's industrial engines rely on liquid fuel of a certain density. The demand to stay with that infrastructure is strong. Alternative energy technology is immature and alternative, renewable energy sources do not offer the same energy per volume as fossil fuels. They are harder to store and unpredictable to obtain. Only the sun supplies a surplus of energy in comparison to current need. Wind is the next most abundant source. Other sources, like geothermal or ocean waves, provide far less energy. Biomass fuel is particularly unsustainable.

“Any massive, intensive monocultural plantings of energy crops could only accelerate the decline of ecosystems.”

When it comes to global warming, carbon dioxide gets all the press, but methane, a greenhouse gas generated by agricultural usages, is “an order of magnitude” greater in terms of its heat-trapping characteristics. Ocean waters, especially in the Atlantic, have been expanding and sea levels rising. So many factors influence the calculation of the effect of ocean changes that estimates are very rough. For example, the “mean sea level increase” from 2000 to 2100 could be as high as 90 centimeters (30 inches) or as low as 10 centimeters (4 inches). Warming will intensify water cycles with more flooding in flood-prone areas and more droughts where it is dry.

“Essential ecosystemic services...have already been modified, reduced and compromised to a worrisome degree.”

The difficulty of quantifying the health impact of global warming makes economic forecasting more challenging. Warmer climates mean more allergens making more people ill and making illnesses more severe. Figuring out the cost of missed workdays or more medical care is relatively easy, but what is the economic impact of missed school days or lives spent in poor health? The world also faces environmental threats related to soil erosion, less land available for farming and more flooding as a result of faulty water management. Human activity has also changed the water and nitrogen cycles, both potentially more catastrophic than carbon dioxide warming.

“Overexploitation, loss of natural habitats, and species introductions and invasions lead to ecosystemic impoverishment and homogenization.”

Wheat, corn and rice, the staples of the worlds' diet, are grown globally. Their cultivation consumes about 15% of the Earth's surface, not counting ice-bound areas, and stunts the rich biodiversity of ecosystems. Loss of biodiversity erodes ecosystems' resilience, threatens their economic utility and endangers their resident species. In fact, the rate of species extinctions is likely to grow over the next 50 years. It took millennia to perfect animal and plant species, which the planet is losing at an increasing rate (now 2% a year). Human land use creates a more homogenous environment and costs billions in lost functionality in key ecosystems. Interlocking, interconnected biological systems are complex, and people cannot duplicate or manufacture them. No one knows how much degradation any ecosystem can take before it begins to crumble.

## Overusing Antibiotics

The 1940s discovery of penicillin and other antibiotics has greatly extended life expectancies. Predictably, bacterial strains have mutated to become resistant to penicillin and other antibiotics. Humans have accelerated this cycle of resistance by grossly overusing antibiotics for minor infections, and by regularly dosing livestock with them, causing resistance in wild animals as well. Infection is already the world's second leading cause of death. If all antibiotics lose their effectiveness, humanity would suffer disastrous consequences. Most pharmaceutical companies no longer engage in the research and development necessary to produce new, effective antibiotics because the profit margin is not high enough, compared to what these companies can make on drugs people must take daily. Forty years have elapsed since manufacturers last developed new drugs to combat tuberculosis, a significant threat in impoverished nations.

“Sparrows, crows, pigeons, rats, mice and feral dogs are the inheritors of the biosphere molded by humans...The loss of biodiversity and bioinvasions have major economic consequences.”

Statistically viewing the risk of death per person per length of time exposed to danger, your chance of dying in a car wreck is three times greater than your risk of dying in a terrorist attack. This statistic, while true, does not distinguish between those who choose to take a risk over a certain period of time (say, by driving a car for an hour) and those who do not, like the innocent victims of unpredictable catastrophes that can happen at any time (though the odds of an actual terrorist event are slight in most places, even if they are higher in the Middle East). Obsession with preparedness against terrorist attacks should not keep nations from preparing for much likelier threats, like war and pandemic or even natural disasters. Threats in those areas are easier to get ready for and, sometimes, easier to predict.

## About the Author

Prolific science writer **Vaclav Smil** teaches at the University of Manitoba. His books include *Energy at the Crossroads* and *Energies: An Illustrated Guide to the Biosphere and Civilization*.

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