

CHAPTER 8

Existential Risks Involving Earth's Biosphere

"Existential risks . . . are threats that could cause our [*Homo sapiens*] extinction or destroy the potential of Earth-originating intelligent life. . . . Existential risks have a cluster of features that make ordinary risk management ineffective" (Bostrom 2002). In the 160,000-200,000 years that *Homo sapiens* has been on Earth, the species has been exposed to a variety of risks, such as disease, starvation, and hostile tribes or armies. If individuals or a culture/nation take foolish risks, death may be the result. However, if the risk is at the global level and is unsuccessful, extinction may be the result.

Test fast, fail fast, adjust fast.

Tom Peters

Living at risk is jumping off a cliff and building your wings on the way down.

Ray Bradbury

Existentialism is a philosophical movement embracing diverse doctrines but centering on analysis of individual existence in an unfathomable universe and the plight of the individual (who must assume ultimate responsibility for acts of free will without any certain knowledge of what is right or wrong or good or bad) (<http://www.merriam-webster.com/dictionary/existentialsim>). In some cases, the universe is depicted as hostile or indifferent — for example, Earth can indeed become a hostile environment when the conditions change markedly for existing life forms. However, in the past, an adequate number of species survived unsuitable conditions to produce a diverse array of species suited to the new conditions. Five major periods of biological extinction have occurred on this planet. Each was caused by physical events outside the normal climatic and other physical disturbances that species, and entire ecosystems, experience and survive. The first, second, and third extinctions have been attributed to climate change with 25%, 19%, and 54% taxonomic families lost, respectively. The fourth extinction involved 23% taxonomic families lost with no exact cause known. The fifth extinction was possibly caused by Earth's collision with another celestial body or a volcanic event, with 17% taxonomic families lost (Eldredge 2001). The sixth great biological extinction appears to be underway (Larsen 2004).

The universe is indeed indifferent to humankind's fate, both as individuals and as a species. The universal laws of biology, chemistry, and physics must be obeyed — for example, an individual should not expect special treatment from the law of gravity. Science has provided humans with much information about these laws, but, even when scientists provide the information, it is often ignored. At present, a well financed effort is under way to discredit scientific evidence (Orekes and Conway 2011). Consequently, of what value is the scientific information when a major, organized effort is attempting to cast doubt on it?

Existential Risk #1

An individual can file for bankruptcy after making serious financial mistakes, a nation can bail out a "too big to fail" bank, the European Union might bail out a nation, but no entity can bail out a planet following a major, global, financial meltdown. Economic convergence is the theory that the economic factor, especially productivity, applying in a group of countries that should move them closer together (<http://www.economics-dictionary.com/definiton/convergence>). However, when resources, especially food and water, are scarce and expensive, divergence in the form of resource wars seems probable.

Most, probably all, complex systems have tipping points that, if passed, result in irreversible change (Gladwell 2000). At present, no early warning signal can show that complex systems are nearing a tipping point, so prudence demands the avoidance of actions that might initiate irreversible change. However, since even numerous failed states (<http://www.foreignpolicy.com/articles/2011/06/17/2011>) appear to represent, collectively, an intractable problem, existential global financial crises should be avoided.

Existential Risk #2

Many, interactive, global, existential risks exist in Earth's biosphere (Cairns 2010). Oceans cover 71% of Earth's surface, so they constitute an extremely important component of the Biosphere. "Life in the oceans is at imminent risk of the worst spate of extinctions in millions of years due to threats such as climate change and over-fishing, . . . Time was running short to counter hazards such as a collapse of coral reefs or a spread of low-oxygen 'dead zones,' . . ." (Reuters 2011). Climate change is indeed a global, existential risk that must be addressed globally, especially since the Biosphere is Earth's life support system. In addition to adverse effects on marine life, sea level rise will have a major impact on coastal cities and affect many people (Kenward 2011).

Existential Risk #3

Biodiversity loss on a large scale is obviously important because species are the basic operational units of the Biosphere. Biotic impoverishment – reduction in the number of individuals in a species so that it is of little or no ecological significance – is also a major factor. Even dominant species can become extinct during a mass extinction. "The fossil record shows, however, that the major extinction events of the geologic past have played a larger and more complex role, by removing not just marginal players but also dominant incumbents, owing at least in part to extinction selectivities that are partly independent of those seen under 'normal' extinction regimes" (Jablonski 2001). The dominant species may also be most favored by conditions produced by the environment they inhabit, and they lose their competitive advantage when the biosphere goes into disequilibrium. *Homo sapiens* has only experienced the present Biosphere; therefore, its replacement poses an existential risk.

Existential Risk #4

For nearly the entire 200,000 years that *Homo sapiens* has existed, humanity has been able to live off nature's interest – consuming resources at or below regeneration levels and producing carbon dioxide at a rate within Earth's assimilative capacity. "Sustainability requires living within the regenerative capacity of the Biosphere. . . . Our accounts indicate that human demand may well have exceeded the biosphere's regenerative capacity since the 1980s. According to this preliminary and exploratory assessment, humanity's load corresponded to 70% of the global capacity of the global biosphere in 1961, and grew to 120% in 1999" (Wackernagel et al. 2002). The situation is worsening rapidly since Earth Overshoot Day was reached on August 21 in 2010 with an overshoot of 150% (Global Footprint Network 2011). Such percentages are clearly unsustainable and a very serious existential risk! If such numbers arose for the conventional economy, dire warnings would be issued. But, since it's only the biosphere, why worry?

Existential Risk #5

In 1798, Thomas Robert Malthus, a graduate of Cambridge University, wrote "The Principles of Population" in which he noted that population growth would always outrun food supply. The late 1700s and 1800s provided evidence for both hunger and poverty in England, which were eloquently described by Charles Dickens. Ironically, Malthus was condemned for reporting what he observed despite the fact that hunger still exists in the 21st century, even in wealthy countries. "To secure a quality life for current and future generations, sufficient land, water, and energy must be available. Worldwide today there is evidence that food production and distribution processes are problematic; more than 3.7 billion humans are now malnourished. With the imbalance growing between population numbers and vital life maintaining resources, humans must actively conserve cropland, freshwater, energy, and biological resources" (Pimentel and Pimentel 2006).

Projections of future population growth indicate another 3 billion humans will be added in the 21st century, bringing the human population total to approximately 10 billion. Food security means having a reliable supply of food in order to lead a quality life (Martin 2011). However, Malthus showed many years ago that, unless something other than starvation and misery limit exponential population growth, increasing the supply of food while ignoring population growth just increases the number of people living in misery. "This fall [2011] the Earth's human population will exceed 7 billion. It took modern humans about 200,000 years to reach 1 billion in 1800. Since 1960, humanity has grown by one billion about every 12 years. . . . Some suggest that the Earth has plenty of room for more people, since a geographic area such as the state of Texas could hold the entire current world population at the density of the state of New York" (Faller 2011). *Homo sapiens* has had hundreds of years to solve this problem and has failed. The result is billions of people living in misery.

Existential Risk #6

"Climate change is the ultimate collective-action problem. . . . Its only solution lies in a level of global cooperation that humanity has never seen before. . . . Purely technological fixes . . . will not be sufficient to mitigate or successfully adapt to climate change" (Smith 2009). The way humankind views technology in the 21st century appears to be a way to avoid personal and social change by making it possible to continue business as usual.

Existential Risk #7

In the United States, the discord about climate change has evolved into an assault on science (Hulme 2009). Climate change and its consequences are due to the universal laws of nature, and *Homo sapiens* can neither alter them nor ignore them. Humankind has been accustomed to believing that these laws operate for humankind's pleasure instead of using the information gained from these laws to decrease risk of extinction for the human species. In other words, *Homo sapiens* is only one species out of a huge interacting web of species and interspecies relationships within the Biosphere that are important to human survival as a species. Discord has worsened since 2009 to the extent that only the implacable universal laws can serve as a unifying theme.

At a global warming denier conference at the Heartland Institute, President Joe Bast stated that fossil fuel dependency is not a problem. A sign in the lobby of the meeting facility read (Lacey 2011):

GLOBAL WARMING?	
NOT MAN MADE	NOT HARMFUL
<ul style="list-style-type: none">• <i>It's natural variation</i>• <i>Human impact is very small</i>• <i>Computer models are flawed</i>• <i>There is no "consensus"</i>	<ul style="list-style-type: none">• <i>Past warmings were beneficial</i>• <i>No current harms</i>• <i>Future warmings will be modest</i>• <i>Warmer is better</i>

These assertions are not evidence. Climate scientists who publish in peer-reviewed scientific journals have evidence. No middle ground exists in such situations. "There didn't seem to be much agreement from the attendees about why – or if – climate was changing. But there was unanimous agreement that the IPCC, the Obama Administration, James Hansen and the environmentalists are part of a plot to grow government and take over people's lives. The conference is a political one, not a scientific one" (Lacey 2011). However, this discord involves more than science – controlling anthropogenic greenhouse gas emissions means regulating them; to many people, regulation means BIG GOVERNMENT. However, climate change has adverse effects upon the Biosphere, which is the source of renewable resources that are essential to the economy. Society's enlightened self interest requires protection of the Biosphere that also serves as the planet's life support system.

Conclusions

Science has served humankind well for many years. It has increased the human life span dramatically. Scientific research has been the foundation of the technologies that are an integral part of humankind's daily lives, even of those people who attempt to discredit science. It has provided much knowledge about the universal laws of nature, which have produced Earth and the Biosphere that envelopes it. Scientific research will be essential to identify and cope with existential risks that *Homo sapiens* has never encountered in its 200,000-year history. Policy should be based on the preponderance of scientific evidence produced by credentialed scientists and published in peer-reviewed journals. If dissenters have some scientific credentials and if they have strong counter evidence, they should be able to prevail because dissimilar, verifiable stances are also an integral part of the scientific process.

Scientists will always be identifying risks that will be labeled "bad news" by special interest groups that perceive the evidence as a threat to their profits or ideology. Disinformation will always be a tool of the "spin doctors," but the scientific process has always triumphed because it produces validated evidence as a result of peer review, both before and after publication. In the absence of scientific evidence, *Homo sapiens* will be unaware of risks – particularly those caused by new, untested technologies or failure of existing technologies (e.g., Fukushima nuclear catastrophe) once thought to be "safe."

The universal laws of nature are neither hostile nor indifferent to human fate unless they are ignored or violated. In addition, species whose lifestyle is not compatible with nature's laws must suffer consequences. Existential risks are ones that neither *Homo sapiens* nor individuals of the species have encountered – global financial meltdown, oceanic change, biotic impoverishment, ecological overshoot, human overpopulation at 7 billion, and climate change. Humankind should pay more attention to what is happening to the environment now and avoid new risks, even if the risks provide temporary economic benefits, because no economic benefit is worth extinction.

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