

The limits to human domination of nature

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Issues of war and peace, racism, sexism, homophobia, xenophobia, and economic oppression are the result of humans interacting with other humans. These dysfunctions are as old as humanity, and they cause great pain and suffering. As an optimist, I hope they are receding, but as a realist, I know they will never go away. While humans have always

battled, as my colleague Peter Coleman has observed, much more often, they have made peace together. We cooperate more than we fight, even if it's the fights that history takes note of. As the journalists often say: "If it bleeds, it leads." When someone helps a mom carry her baby stroller up the subway stairs, it's not news. Push that mom down the steps, and there is a photo on the front page of the *New York Post*. Anyway, carrying the stroller is a common occurrence; assault, fortunately, is not. Humans interacting with humans is an old story. So too, have been our efforts to use the planet's resources for food, clothing, and shelter. But there is something new in the world—we not only use the planet, but our technology has begun to enable us to change the planet and its fundamental systems.

For at least half a millennium, human technology has impacted elements of our planet. When sailing ships carried Europeans to the American continent, they brought with them diseases that native Americans had not developed immunities to. Many died from the "invasive species" of European disease. Today that process is accelerated by global air travel and trade, and so we find ourselves falling victim to viruses we have little ability to resist. On a larger scale, our chemicals and plastics invade the earth's soil, water and air and damage the living creatures that depend on those resources. Some of the impacts of our technology are large-scale, physical and well understood, such as climate change. Other impacts of technology such as the Coronavirus and various assaults on biodiversity are more complex, less studied, and not as well understood.

Our economic philosophy is to introduce new technologies and chemicals into our daily life and worry about their impact on health and the environment later. In a global economy, there is increased pressure to innovate to compete. Applying the precautionary principle to new technologies as we do with new drugs would reduce the pace of innovation and would therefore reduce economic growth. In our current economic-focused mindset, there is no time to measure the side-effects

of new technologies as we do for new drugs. Since most of the [economic growth](#) of the past century has been a result of the commercial application of new technologies, our economic system is designed to ignore environmental impacts until they are so dangerous, they can't be denied.

In 1970, at the beginning of our effort to seriously regulate environmental pollution, there were 3.7 billion people on the planet; today, there are nearly 7.9 billion people. While our population has more than doubled in the past half-century, our planet has not. It's the same size planet we had back in 1970. Technology has allowed us to increase production while reducing pollution. Our technologies also allow us to utilize more of the planet's resources than ever before, and the rate of population growth has been reduced. In some of the more developed parts of the world, population is shrinking. But resource consumption continues to grow as our economies develop.

There is little question that human activities have damaged and sometimes dominated nature. But dominating nature is proving to be a little more difficult than some might have thought. The forces of natural environmental systems have proven to be more than current technologies can handle. We are inadvertently and deliberately damaging the natural systems that provide us with biological necessities: food, water, and air. There are scientists who discuss "[geoengineering](#)" or efforts to influence natural systems at a planetary level. Fortunately, there is no market for geoengineering or obvious commercial application of these technologies. Large-scale technologies such as carbon capture and storage will require government funding at the level of the American military budget. It's possible it could happen, but I wouldn't bet on it. There has long been serious discussion about geoengineering to combat climate change. As Fred Pearce wrote several years ago in *Yale Environment 360*:

"Geoengineering the climate to halt global warming has been discussed

almost as long as the threat of warming itself. American researchers back in the 1960s suggested floating billions of white objects such as golf balls on the oceans to reflect sunlight. In 1977, Cesare Marchetti of the Austria-based International Institute for Applied Systems Analysis discussed ways of catching all of Europe's CO₂ emissions and injecting them into [sinking Atlantic Ocean currents](#). In 1982, Soviet scientist Mikhail Budyko proposed filling the stratosphere with sulfate particles to reflect sunlight back into space. The [first experiments](#) to test the idea of fertilizing the oceans with iron to stimulate the growth of CO₂-absorbing algae were carried out by British researchers in 1995. Two years later, Edward Teller, inventor of the hydrogen bomb, proposed putting [giant mirrors](#) into space. Still, many climate scientists until recently regarded such proposals as fringe, if not heretical, arguing that they undermine the case for urgent reductions in greenhouse gas emissions."

The sheer hubris of advocates of geoengineering needs to be understood as horrifying given our current level of knowledge of earth systems science and ecology. We can't even predict the indirect ecological impact of building a sea wall. Why do we believe we understand the earth well enough to engineer on a planetary level? Still, if one of these egomaniacal billionaires figures out a way to monetize manipulations of our planet's fundamental systems, we might eventually become nostalgic for current existential threats like [climate](#) change. Our ability to disrupt the environment on a planetary scale is limited but growing. Our understanding of the impacts of our planned and unplanned disruptions is also limited and growing far slower than needed.

What is missing from our economic system and its technological base is humility and reverence for a universe that may, well, in some measure, always be beyond scientific understanding. Creation and our own evolution can be studied, but in my view, there may always be a point where science must give way to something I might call spiritual, and

others might call religious. We have built our social, political, and economic order around science and technology and that is a path we cannot turn away from. We need more funding for science education and research- particularly about our planet and its amazing complexity. We need to pay serious attention to the environmental effects of human activities and build sustainable human settlements that minimize our impact on the planet. But we also need to build a reverence for nature and the environment into our value system. We need to devote more thought and resources to preserving and protecting natural systems.

In the science-fiction franchise Star Wars, the home planet is a world-city. There is no nature. When I was growing up, the cartoon show The Jetsons was the same. The dog walked on a treadmill, cars flew through the sky, food came from a machine in the wall and there were no trees or gardens. If the past is prologue and trends continue, there will come a time when human technology could supplant nature. We are nowhere near that now, but the question we need to address is: Would we ever want to live in a world without nature? While I doubt anyone would ever plan to eradicate our natural ecological systems, no one ever planned to warm the planet or inundate its oceans with plastic. Although we don't know how to monetize geoengineering, we have monetized nature. Homes with views of unpolluted nature and water, park access, and clean air cost more than the same homes without those amenities. Tourism in natural settings is a multi-billion-dollar global business. Humans value nature and will pay to preserve it and enjoy it. Generally, I am an advocate of technological fixes for environmental problems. Technological solutions are usually the best way to solve the problems caused by technology. But there are limits. Geoengineering is where I draw the line. In its place, let's teach and learn humility, spirituality, and a reverence for the miraculous planet we have been given and must preserve for those who follow us.

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