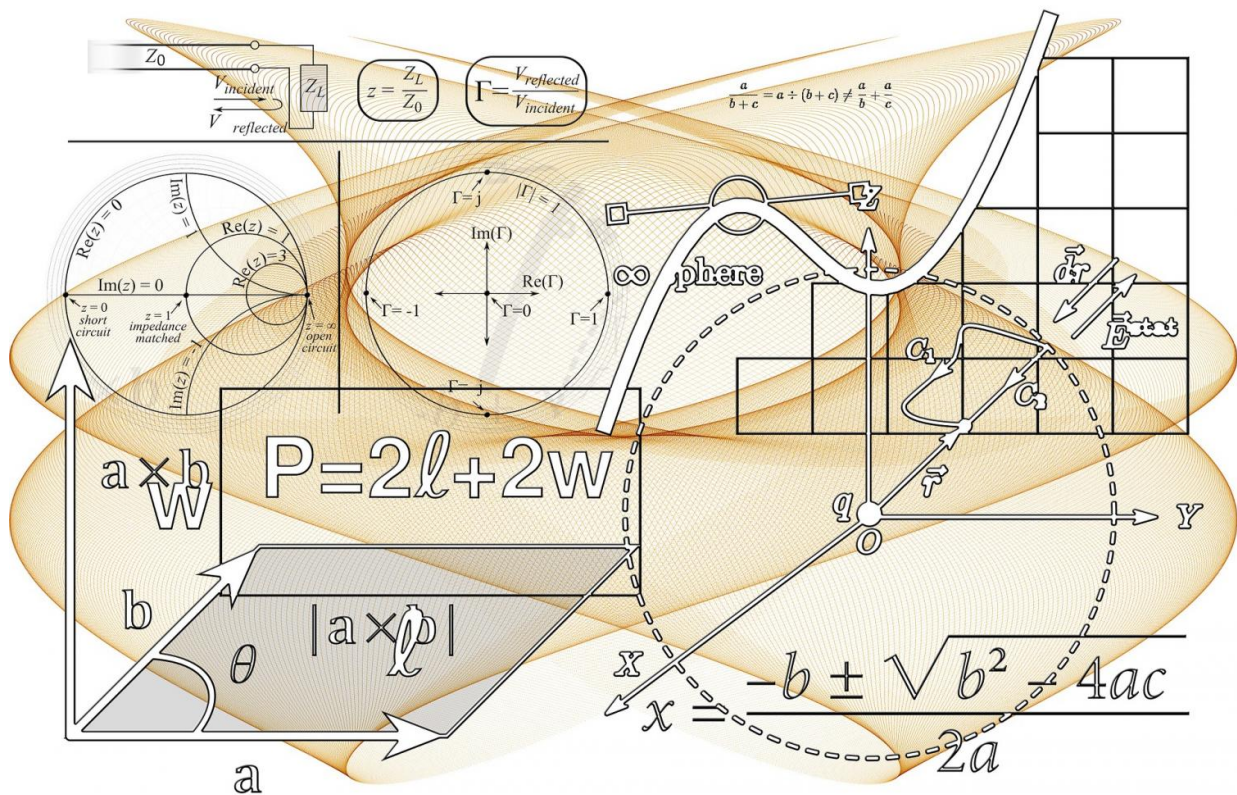


The use of science in environmental decision making

May 13 2019, by Steve Cohen



Credit: CC0 Public Domain

The level of scientific literacy in the United States is low by so many measures there isn't a reason to rollout the data on science education in

the United States to make the point. With a determined effort, we could overcome our science literacy problem, but I see no sign of deep concern about the state of science education. The impact of our lack of science literacy can be seen in decision making in the White House and in regulatory agencies like EPA that are aggressively resisting science. Environmental science is seen as biased and even anti-capitalist. I'm certain this is the result of climate and other environmental scientists expressing their alarm about the impact of pollution on the planet and their effort to communicate that threat. Instead of debating the validity of scientific findings on scientific grounds, some people reject environmental science entirely. This exacerbates our science literacy problem and is profoundly troubling.

We live in a complex world, built by centuries of scientific advances from the Enlightenment to the present. That world provides enormous benefits like the computer I am writing this on, but also creates enormous risks ranging from global warming to biodiversity loss to exposure to toxic substances. We rely on science for our comforts and economic advances, but also for the analysis of risk and methods of mitigating or reducing risk. To some, the science that yields economic benefit seems pure but the science that identifies potential costs seems biased.

Science is not without value choices and ideology. The problems that scientists choose to study reflects what they consider important and what they consider to be important reflects their values. An earth scientist's values may simply be the advance of human knowledge about how the earth works and may have little connection to any concerns about the impact of humans on the planet's well-being, but even the goal of advancing knowledge must also be seen as a value choice. While values play a role in science, the scientific method places a high value on the role of measurement and observations. In other words, a high value is placed on verified facts and observations. Good science tries to reduce

bias. The scientific method itself, the importance of replicability, peer review and other standards of scientific inquiry are designed to make it possible to establish facts. These methods are reasonably clear, and most scientists and students of science know how to distinguish sound science from unsound science. But scientific illiterates, like President Donald Trump and a number of other government and business leaders, can't distinguish sound science from unsound science and they assume that [environmental science](#) reflects the biases of the "ideological" scientists who choose to study environmental issues.

Some political leaders assume that scientific analysis is like political analysis, subject to spin and a wide range of interpretations. While new discoveries and observations may be interpreted in a variety of ways, the goal of science is to achieve consensus. Scientists read the challenges to their work and learn from critiques and from each other. That is a key way that scientific knowledge expands. A competent doctor will encourage patients to get a second opinion of a diagnosis. In fact, they will engage colleagues in that effort before informing a patient of their diagnosis.

While science operates according to a carefully constructed and reasonably well understood set of norms, it can and has been corrupted by economic power. Tobacco interests were famous for paying scientists to downplay the connection between smoking and lung cancer. Most recently we saw the conflict between sound science and economic interest in EPA as that agency tried to decide how to regulate asbestos. Lisa Friedman of the *New York Times* reported last week that:

"Senior officials at the Environmental Protection Agency disregarded the advice of their own scientists and lawyers in April when the agency issued a rule that restricted but did not ban asbestos, according to two internal memos... Andrew Wheeler, the E.P.A. administrator, said when the rule was issued that it would significantly strengthen public health

protections. But in the memos, dated Aug. 10, more than a dozen of E.P.A.'s own experts urged the agency to ban asbestos outright, as do most other industrialized nations...It was not the first time administration has sidelined government scientists. Under President Trump, the E.P.A. has rolled back environmental protections and come under criticism for relaxing rules on toxic chemicals. Last month, the agency weakened a proposed standard for cleaning up groundwater pollution caused by toxic chemicals. In March, it scaled back a proposed ban on a deadly chemical in paint strippers. And it has rejected a proposed ban on the use of chlorpyrifos, a pesticide that has sickened farm workers and been linked to developmental disabilities in their children..."

The Trump EPA rarely misses an opportunity to tilt a regulation away from human and environmental safety toward a narrow but well defined, economic benefit. During the 2020 presidential campaign, we will hear that this anti-regulatory zeal has contributed to the business confidence that has contributed to the economic growth we have seen during the Trump Administration. While the idea horrifies me, business antipathy to regulation seems hard-wired into America's culture. The counter to that cultural norm takes place when there has been an empirical demonstration of harm. When the same type of Boeing jet crashes twice within months for reasons that seem suspiciously similar, business leaders join the public in a call for greater government oversight.

We put our faith in companies and governments to protect us against potential risks we don't understand in order to benefit from products and services that provide benefits we want. It is science that creates the technologies we don't understand but benefit from and it is science that must be relied on to alert us to the risks of these technologies. But the system breaks down if the [science](#) is not objective, not understood, or ignored.

The risks caused by toxic substances in our environment, or by pollutants like greenhouse gasses are complicated. Sometimes causality is difficult to prove. Sometimes danger is in the future and models must be developed to project future harm. The danger to children of lead in water is long term and may not be immediately obvious. The impact of smoking on your lungs is also not immediate. The danger of flawed software in an airplane is sadly more immediate and the outcome more dramatic. Biodiversity, on the other hand, is maintained by a complex web of biological and chemical relationships that scientists can spend a lifetime studying and still know only a fraction of the reality of risk posed to any given ecological system.

What decision makers need is at least a minimal understanding of chemistry, biology, physiology, physics, and ecology to undertake sophisticated and effective environmental decision making. They also need to value the preservation of the planet for posterity. The need for a viable planet is obvious to many people, but not to everyone. Jeff Bezos recently presented his vision of space travel that would create artificial environments in outer space for a trillion earthlings. I guess a trillion would include a lot of Amazon Prime customers. According to a recent piece by Kenneth Chang of the *New York Times*:

"Mr. Bezos described on Thursday a dreamy, ambitious vision of the future: a trillion people in space, living not on moons or planets, but bucolic space colonies...He spent the first half of the presentation selling the idea of space and countering criticisms that space exploration is a frivolous pursuit that diverts people's attention from pressing problems on Earth. But he argued that humanity must eventually push into space. Rising energy consumption is crucial to raising the standard of living for more people, but "We will run out of energy," Mr. Bezos said. "This is just arithmetic. It's going to happen." At that point, to remain on Earth would require rationing and declining opportunities. But the rest of the solar system offers virtually limitless resources. "Do we want stasis and

rationing or do we want dynamism and growth?" he asked rhetorically. "This is an easy choice. We know what we want. We just have to get busy."

It may be that someday we will develop the technology to live in outer space, it may be that we will so poison the planet that we'll have no choice. But the scientific case made by Bezos claims that we will run out of energy. That is a scientific conclusion that may well be worthy of study. But Bezos cites no study when he makes the claim. He might want to take a closer look at the sun as a source of energy. Other [decision makers](#) have dismissed climate change, the impact of asbestos, smoking and countless other dangers. They assert scientific conclusions that fit into their plans to accumulate money, power or both. We need to do a better job of integrating scientific knowledge into management decision making. If we don't we will leave ourselves open to sales pitches ranging from Bezos futuristic vision to Trump's more nostalgic rap. The world is too complicated, interconnected and dangerous to act without real scientific observations and analysis.

This story is republished courtesy of Earth Institute, Columbia University
<http://blogs.ei.columbia.edu>.

Provided by Earth Institute, Columbia University

Citation: The use of science in environmental decision making (2019, May 13) retrieved 17 July 2024 from <https://phys.org/news/2019-05-science-environmental-decision.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.