

Our Swan Song: Science, Innovation, and the Big Picture

By Water Quality & Health Council

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In a nutshell...

The Water Quality & Health Council has acted as an outside technical advisory group to the American Chemistry Council's Chlorine Chemistry Division for the past 29 years. For the last nine of these, we have posted a weekly *Perspectives* article on public health topics ranging from waterborne illness trends, to the chemistry of bather urine in swimming pools, to destroying the COVID-19 virus on surfaces, and *so much* more! Our nine member group has operated like a well-oiled machine, with scientific, technical, and consumer advocacy expertise molding weekly articles to help inform the public. Amid the current pandemic, our run is about to end, and this article is our swan song.

The Silent Miracle

In their 2018 best-seller, *Factfulness: Ten Reasons We're Wrong About the World—and Why Things Are Better Than You Think*¹, Hans Rosling and his two co-authors make the interesting point that while the majority of people believe the world is getting worse in numerous ways, they are wrong. The authors use official data compiled by the World Bank and the United Nations (U.N.) to demonstrate “the secret silent miracle of human progress.” This miracle includes positive changes in world peace, life expectancy, infant mortality, income, health, education, deaths from natural disasters, and air travel that are “world-changing but too slow or too fragmented to ever qualify as news.”



The Water Quality & Health Council: Back L-R: [Bob Vincent](#), [Bruce Bernard](#), [Heather Murphy](#), [Steve Hubbs](#); Middle: [Barbara Soule](#), [Linda Golodner](#); Front: [Ralph Morris](#), [Joan Rose](#), [Chris Wiant](#)

¹ Rosling, H., Rosling, O., Ronnlund, A.R. (2018), Flatiron Books, New York, NY.

Rather than a huge gap between the “developed” and “developing” worlds, the *Factfulness* authors make the point that 75% of humanity lives in middle-income countries, and that most people have their basic human needs met. In short, a fact-based worldview is life-changing. That said, the picture is not completely rosy. The authors repeat the mantra: “Things can be bad, and getting better at the same time,” but by knowing where the worst problems lie, we can prioritize our efforts.

Science and Technology

We live in an age of endless innovation with change taking place at astounding rates. Just witness the [very amusing 2019 video](#) of two 17-year olds trying to use a rotary phone, a technology that was largely replaced by the touch-tone phone in the 1980s, only to be widely supplanted in the 2000s by mobile phones. But progress is uneven. In recent years many people in poorer countries have leap-frogged over clunky phones directly to a mobile phone, to the point that there are more people with mobile phones ([over 5 billion](#)) than there are with access to safely managed sanitation, including toilets ([4.2 billion](#)). And as sanitation technology is more widely installed, there may be opportunities to once again leapfrog over traditional sanitation technology to more innovative options that better conserve resources (see our video, ["The Link Between Wastewater and Drinking Water"](#)).

Some innovations have enormous consequences for public health. Historically, [U.S. municipal drinking water became significantly safer](#) as a result of the “Chlorine Revolution,” which in the U.S. was led by a modest New Jersey physician. Dr. John L. Leal correctly hypothesized in 1908 that rampant typhoid fever in Jersey City could be controlled by adding miniscule levels of chlorine to the municipal drinking water. The experiment was successful and led to the widespread adoption of drinking water chlorination, which, after more than 110 years, continues to be shared globally to underserved organizations by groups such as *Engineers Without Borders*. By 1997, *Life* magazine called the filtration of drinking water plus the use of chlorine “probably the most significant public health advancement of the millennium.” Indeed, a [2005 statistical study](#) of disease rates in major U.S. cities concluded that clean drinking was responsible for nearly half of the total mortality reduction, three-quarters of the infant mortality reduction, and nearly two-thirds of the child mortality reduction during the late 19th and early 20th centuries.

Using Science to Improve Our World

Scientific and technological advancements are based firmly in the scientific method, a standard way to investigate the natural world in the most logical way possible. The scientific method includes constructing a hypothesis to explain natural phenomena, followed by designing experiments and collecting data to test that hypothesis.

Those who formulate hypotheses must be flexible in adjusting them to accommodate unexpected but repeatedly confirmed observations. Practitioners of the scientific method understand there is no such thing as “set” science. Scientists must be open always to changing their views based on ongoing observation. When we approach science with an open mind, we are truly followers of the scientific method. Everyone, from politicians to beauticians to electricians, can embrace this important way of processing information about the world.

To the Future

In *Factfulness*, the authors identify five global risks they deem most concerning and capable of pausing human progress for many years or decades: global pandemic, financial collapse, world war, climate change, and extreme poverty. The lead author, Hans Rosling, died of pancreatic cancer in early 2017, three years before the COVID-19 pandemic began, but that prediction was spot-on. Based on observations of those tracking progress toward the U.N. Sustainable Development Goals, the COVID-19 pandemic may indeed be pausing and even [reversing progress towards goals such as Sustainable Development Goal #1, eliminating poverty](#). In the near term, we trust an effective COVID-19 vaccine will be available to free us from the bonds of the virus. We are all part of this global experiment, which is catalyzing change, both good and bad. On the positive side, we expect the pandemic has forced an acute awareness of hand hygiene and the value of masking to prevent the spread of respiratory illnesses. The pre-pandemic trend toward increased teleworking accelerated during the pandemic, demonstrating that many of us can indeed work productively from home.

Overall, society will continue to be the beneficiaries of breathtaking new technological advances, thanks to researchers' use of the hugely successful scientific method. We can no better predict what these will be than Dr. Leal in 1908 could have predicted the invention of the smartphone. On balance, we are hopeful for a future full of life-enhancing innovations that can be shared rapidly with all people. We hope you too embrace the scientific method, and we wish you a fact-based perspective for viewing this bad, but "getting better," and still awesome world.

The inspiration for this article, the book "Factfulness," was gifted to one of us by a senior at a liberal arts college. Our experience in every country we have had the privilege to work in is that the youth of this world will help us achieve greater things than we can imagine. This fills us with great hope for the future.

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