Environmental Science & Technology

Comment

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The Essential Functions

I see a series of worrisome exponential curves in my mind's eye. The first is a plot of global population over the past three hundred years. The others depict the ways in which our health and ecosystems are being stressed by the unintended consequences of humanity's progress. They include data like the mass of plastic accumulated in the mid-Pacific gyre, the increase in concentrations of fine particles in the air over Beijing, and the growing number of halogenated compounds detected in human blood.

All exponential functions tied to human endeavors share a common property: they do not continue indefinitely. The actions of society determine when exponential growth stops, as well as the shapes that the functions take as they transition to something different. The adoption of new public policies, the development of more effective treatment technologies, and the actions that people follow in their daily lives will determine the future shapes of the curves.

We can already anticipate how the global population plot will change during the twenty-first century: Demographers predict that the earth's population will level off at somewhere between 8 and 10 billion people. But the shapes of the other plots are a lot less certain. I believe that our community—the authors and readers of *Environmental Science & Technology*—must play a pivotal role in determining the shapes of those other plots. Our contributions need to help society to make educated decisions about the inevitable trade-offs between environmental protection and economic development. We must invent new treatment technologies that can control pollution at its source. And increasingly, our research will have to inform decisions about the inevitable energy transition that will occur in coming decades.

In the journal's first editorial in 1967, *ES&T*'s founding editor James Morgan wrote, "Scientific understanding of the environment and the development of chemical technologies for environmental control are not ends in themselves. The goal is the benefit of man." Although our underlying motivation has not changed, the problems we face have become more complex. The new challenges do not lend themselves to simple solutions. More than ever, the problems we seek to solve require knowledge about phenomena occurring at regional and global scales, the actions of multiple stakeholders, and the potential for creating unanticipated consequences.

The stakes also have become higher. The clock is running out on our efforts to solve big problems like carbon capture and storage, the development of robust potable water recycling systems and the creation of effective strategies for controlling air pollution originating on different continents. Perhaps this is the way the world changes as we move up the exponential curves. Or maybe it is just the recognition of the complex nature of global environmental problems.

Along the way, another big change has occurred. Our community has undergone a dramatic expansion. *ES&T* is no longer an environmental chemistry journal read mainly by researchers in North American and Western Europe. The broad, global perspective of *ES&T* is reflected in the composition of our editors, advisory board, reviewers, authors, and readers. Judging by the increase in submissions to *ES&T*, there are probably more researchers with interest in the topics covered by the journal working today than existed during the previous five decades combined. In my opinion, the increased size and diversity of our community holds the answer to many of our current challenges.

What does this mean for *ES&T*? We are proud of our reputation as the most read and most cited journal covering the environment. But bibliographic indicators will not save the planet. As Editor-in-Chief, I will work with the editorial team to leverage our standing as the leading environmental research journal to become the authoritative voice for advancing solutions to the environmental challenges facing society. In other words, *ES&T* will play a larger role in helping society to navigate off of the exponential curves that threaten our future by paying more attention to the likelihood that our research will result in action.

Rest assured, we will continue to publish fundamental research, results of field campaigns that characterize the state of our air, water, soil, and biota and reports describing the development of new treatment technologies. Looking back on our first 48 volumes, it is evident that new theories describing fate, transport, and transformation of contaminants, as well as the development and testing of new measurement techniques have been at the heart of some of our most important contributions. Irrespective of its place on the continuum between theory and practice, if we are going to realize our goal of fostering change, our research has to lead to new knowledge that is relevant to solving the world's most pressing environmental problems.

Given the importance of our endeavor, the breadth of our objectives, the ever-growing number of submissions we receive and our finite capacity to review and publish manuscripts, *ES&T* will have to become more selective. To facilitate this process, we will emphasize the potential impact of research during the review process to a greater degree than in the past. We will actively seek the seminal contributions that people feel compelled to discuss at conferences; the papers that set the research agendas of funding agencies; the research that influences the people tasked with the creation of new policies; and the inventions that inspire the developers of the next generation of pollution control technologies. It is not always possible to predict which papers will have the greatest impact during the review process, but by paying more attention to likely impact, we stand a better chance of realizing our aims.

I conjure up another set of curves in my mind's eye. This time the functions describe the solution to our environmental problems: the new plots trace the future growth in our community, the increasing number of decisions that have been influenced by our journal, and the cumulative effects of our efforts on the exponential curves that had me so worried. The

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second set of graphs depicts the essential functions that define *Environmental Science & Technology*.

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Notes

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