

CORONAVIRUS

Pandemics and the global environment

Dramatic, short-term improvements in the global environment have accompanied the COVID-19 pandemic. Intrigued by these observations, we commissioned a series of papers for *Science Advances* dedicated to studies of pandemics from an environmental perspective. The first in this series is a paper by Liu *et al.* on the decline of nitrogen dioxide over China since the outbreak of COVID-19. Collectively, the series will explore how the Earth system as a whole—not just the human societies developed on it—is affected by pandemics like COVID-19, and how environmental conditions can influence the spread and severity of infection.

The responses of governments around the world to the COVID-19 catastrophe are ongoing, essentially uncontrolled experiments. We should not forget that this experiment is playing out in the context of another uncontrolled experiment of longer duration and greater global consequence: anthropogenic environmental change. Economic lockdowns this year, designed to slow the spread of COVID-19, briefly pressed the pause button on environmental degradation, and the resulting reductions in air and water pollution have been dramatic. For the first time in decades, the peaks of the Himalaya are clearly visible from major cities in northern India and Nepal that are normally among the most polluted urban areas in the world. Venetians marvel at the fact that the water in their famous canals is suddenly so clean that fish are clearly visible. Around the world, many young people living in urban environments are, for the first time, breathing truly fresh air. Both terrestrial and aquatic ecosystems are improving at breakneck speed. Such trends remind us how much our actions drive environmental quality and just how badly we have behaved as stewards of our planet. A few parts of the world have suffered less because of limited human activity. Others have benefitted from enlightened public policy such as the Clean Air Act in the United States. In contrast, parts of Asia where protections have been comparatively weak have experienced some of the most dramatic environmental improvements this year. As more data

emerge, we may find that differences in environmental policy reflect the public health impact of the virus.

In light of how strongly COVID-19 responses seem to have slowed environmental degradation, an important question is how we will act as a species moving forward. Just as the current pandemic is driving us to rethink many cultural institutions, we have a once-in-a-generation opportunity to rethink how we grow back our economies in a way that does not imperil the global environment as we have in recent decades. An obvious step in the right direction would be to invest heavily in green energy, which is about to achieve—and, in some places, has already achieved—cost parity with fossil fuels despite heavy government subsidies to the latter.

The current pandemic also reminds us that Earth itself is a complex, dynamical system. No process in such a system—including the spread of disease—is truly independent of other processes. We must view the emergence of pandemics as part of a larger evolutionary trend involving myriad interconnected biological, chemical, physical, and social processes. The ultimate scientific challenge of the 21st century—understanding how Earth and the societies that inhabit it coevolve—will require development of broader research perspectives that transcend the reductionist approach to science that characterized most of the previous century. In addition, all nations must commit to policy decisions consistent with the outcomes of such research if we hope to optimize public policy in a way that ensures the long-term prosperity of human societies. This age of COVID-19 provides a momentary glimpse of what a better, more sustainable world might be like. Now, all we need are the vision and commitment to action necessary to achieve it.

– Kip Hodges and Jeremy Jackson

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