Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Fifty years ago this very week, 20 million US citizens took to the streets to voice their concerns over environmental degradation and to campaign for a cleaner, more sustainable future. The very first Earth Day—a chorus of speeches, marches, teach-ins, art, and essays grounded in science—had a profound and lasting effect. It led to landmark environmental legislative acts in the US, and subsequently around the world, and cemented environmental challenges in the public consciousness. As a result, many countries today have cleaner air, water, and soils than would otherwise have been the case.

Over the ensuing five decades, Earth Day has become an international day of environmental awareness and is now estimated to reach 1 billion people globally each year through activities such as cleanups, marches, campaigns, and tree-planting schemes coordinated by the Earth Day Network. Environmental legislation has also diversified into comprehensive international frameworks designed to protect and care for different aspects of the environment while championing sustainable development. Our knowledge of how human lifestyles affect the environment has advanced considerably.

Yet for all the successes of the original Earth Day and the developments it inspired, 2020 finds us at a crossroads, where transformative change and action are needed to alleviate unprecedented environmental pressures. What happened, and where do we go from here?

Earth Day 1.0
The first Earth Day took place in an America awash with counterculture and anti-materialist values, a plethora of social movements, and rising concerns surrounding the environmental pressures of economic and population growth. In 1962, Rachel Carson’s seminal publication *Silent Spring* communicated to the public the toxicity crisis of pesticides, the escalating threats of environmental pollution, and the inextricable link that binds together conservation and environmental and human health. One of the main antagonists in this tale was dichlorodiphenyltrichloroethane (DDT), an insecticide applied in agriculture; in addition to decimating beneficial invertebrate populations, it thinned the shells of bird eggs and caused toxicity within the food chain, potentially affecting human health.

*Silent Spring* was not written as a technical report, complete with uncertainties and caveats. It was a popular science book written by a scientist, beautifully illustrated, and made accessible to the lay person. The story was clear, the narrative engaging, the threat obvious, the solution simple—ban DDTs. *Silent Spring* successfully raised concerns that transcended the socio-political barriers that often divide us. It united society behind a common goal and against a common enemy. The US banned the use of DDT in agriculture in 1972.

Carson, like many of her peers then and during the decade that followed, identified as both a scientist and an activist. Scientists were significant contributors to social movements at the time. They were public figures considered to have a degree of political responsibility. Places of academia were considered theaters for social-movement demonstrations, and science shifted to focus on societal challenges. Scientists were generally a trusted part of society, and science informed the environmental movement.

*Silent Spring* also set the stage for a new type of environmental science. The combination of catastrophe narratives, cultural norms, social politics, and the concept of globalization that emerged during the 1970s led to what Michael Egan calls “survival science” or “crisis disciplines:” multidisciplinary problem-solving research streams fed by tributaries of pre-existing environmental sciences. For many, the 1972 Club of Rome report *The Limits to Growth* typified this new approach, sowing the first seeds of what would later become known as sustainability science.

New Order
At the time of Earth Day no. 50, we find ourselves living in a very different world. The association that emerged between growth, consumption, waste, and environmental degradation during the 1960s has escalated to the extent that we are now in danger of exceeding the capacity of the planet’s life-support systems. Cultural norms have changed, society finds itself beguiled by consumerism, and globalization has enhanced inequalities. The environmental concerns that defined the 1960s and 1970s have not been resolved and have become particularly amplified in the Global South (see Goulson’s *Commentary* in this issue). We find ourselves in a state of emergency.

The environmental priority selected by the organizers of Earth Day 2020 is climate action, arguably the defining challenge of our time. Thanks to decades of increasingly comprehensive technical reports from the Intergovernmental Panel on Climate Change and a wealth of academic and popular science literature, we find ourselves armed with a sophisticated understanding of the causes and effects of this planetary threat. Yet definitive action is lacking.

Unlike the environmental challenges laid bare in *Silent Spring*, climate change does not allow for simple narratives with clear solutions. For those fortunate enough to live in the world’s leading economies (the economies largely responsible for the climate crisis), the immediacy of the threat and associated personal risks are difficult to grasp, or at least easier to ignore. Climate change is too often seen as happening to someone else, somewhere else.

That is not to say that there is public disinterest in environmental matters. Far from it. Polls and surveys show that the public is increasingly ranking environmental action among the most important policy priorities. Activism also remains a core component of society—the environmental justice movement is experiencing a resurgence as of late through groups such as the Sunshine Movement, #FridaysForFuture, and Extinction Rebellion. However, the world is less receptive to social
movements than it once was, and the often contradictory meta-narratives that emerge from different groups fail to provide a common stance around which to rally. The type of unified activism so effective in the 1970s today fails to convince at the scale necessary to force change. And as noted in Dietz’s Commentary in this issue, climate change has for many become a politically polarized issue.

Scientists too are finding themselves conflicted. They are being asked to not only conduct their science but also effectively communicate it via various channels in various styles to a variety of audiences—often with little training or support. For those interested in engaging with political and social movements, it is difficult to find the time: scientists are under an increasing amount of pressure, and many are struggling to publish, secure tenure, lead research groups, and teach their students. At the same time, many members of the public expect complete objectivity from scientists. Making recommendations can lead to accusations of vested interests (risking damage to their credibility), personal attacks, and, increasingly, trolling. There is a worry that by speaking our plainly, they could inadvertently undermine the very causes they wish to support.

The heart of the problem is the complexity of climate change. Climate change has often been described as a wicked social problem embedded in complex sociotechnical systems or related to political and cultural change. Wicked problems are not solved once but rather time and time again. And they require a firm understanding of social systems. Although the seeds sown by the crisis disciplines of the 1970s have germinated and matured into the interdisciplinary field of sustainability science, it is only in the current decade that this burgeoning community has recognized the need for solution-orientated research. As discussed by Shrivastava et al. in their Perspective, although multi-faceted research programs such as Future Earth offer hope, sustainability science, and the funding it attracts, remains entrenched in the natural sciences. Shrivastava et al. echo the voices of others in calling for a deeper integration of the social sciences, arts, and humanities and broader efforts to engage beyond the traditional research community and transform into a truly transdisciplinary science. Shrivastava et al. argue that the field of sustainability science must shrug off the shackles of neutral objectivity and embrace reflexivity, values, and ethics if we are to create an equitable and sustainable society.

Tomorrow’s World
The legacy of the first Earth Day is certainly worthy of celebration: trust in experts, education, convergent societal values, and importantly, political will combined to deliver a golden era of environmental action. The complexities of today’s world and the problems we face make it challenging to replicate this recipe for success, but new lessons are being learned, and progress is being made. Like 1970, 2020 had promised to be a year of action. And although top-level meetings on climate action and biodiversity conservation have understandably been postponed in light of the escalating coronavirus disease (COVID-19) pandemic, 2021 still has the potential to usher in a decade of renewed commitment toward achieving the UN’s Sustainable Development Goals. If there is a glimmer of hope within the darkness that is the current COVID-19 crisis, it is the confirmation that trust in science, political will, and convergent societal values still have the potential to turn the tide on our most pressing global challenges. Perhaps the 100th Earth Day will look back in celebration yet.

The One Earth editorial team

https://doi.org/10.1016/j.oneear.2020.04.008