

GROWTH CAN BE

by ANDREW M. ROBERTS

50

YEARS AGO IT MIGHT HAVE BEEN reasonable to fear that because of our bottomless desire for growth, we humans were going to strip our planet bare and poison it with pollution. But not anymore. The past half-century has shown us that we can increase human population and prosperity while also

taking better care of the planet we all live on. We still face real challenges now and in the years ahead, of which global warming is the most pressing. The good news is that we now know the playbook for effectively meeting these challenges. The bad news is that we're not doing a great job of following that playbook at present. We have to do better. We have to get smarter about meeting the problems we face.

In 1970, people took to the streets on the first Earth Day because of how we were treating our world. It's easy to see why they were so concerned. The 20th century, and in particular the post-war decades, witnessed by far the fastest growth in human history. Around the world, populations grew

more quickly than ever before, and economies grew even faster as people strove for a higher standard of living. Unfortunately, it seemed that along with this growth came three side effects, all of which were both inevitable and terrible.

First, we were using up the earth's natural resources at an ever-faster clip. In the U.S., for example, consumption of aluminum, fertilizer and other important materials was growing even more quickly than the overall economy was in the years leading up to Earth Day. On a finite planet, this was a scary trend. If it continued, disaster seemed unavoidable. At MIT, a team led by biophysicist Donella Meadows built a computer simulation of the global economy and used it to run scenarios about how the future would unfold. Their conclusions, published in the 1972 bestseller *The Limits to Growth*, were stark: "We can thus say with some confidence that, under the assumption of no major change in the present system, population and industrial growth will certainly stop within the [twenty-first] century, at the latest. The system...collapses because of a resource crisis."

The second bad side effect of growth was pollution. Air, water and land were all

getting steadily dirtier in the years leading up to Earth Day. Levels of atmospheric sulfur dioxide in the U.S. increased by more than 60 percent in the three decades after 1940, and in 1969, the Cuyahoga River caught fire in downtown Cleveland. There seemed no end in sight to the pollution. *Life* magazine reported in 1970 that "Scientists have solid experimental and theoretical evidence to support...the following predictions: a decade, urban dwellers will have to wear gas masks to survive air pollution....By 1985, air pollution will have reduced the amount of sunlight reaching earth by one half."

The third negative consequence of constant growth was extinction. Creatures that we share the planet with. The passenger pigeon showed that even huge numbers provided no guarantee of survival. It was an abundant early in the nineteenth century, but gone by 1914. Animals from

the North American bison to the sea otter to the snowy egret to the blue whale came close to extinction during the industrial era, and it seemed clear that many others would vanish. As U.S. Senator Gaylord Nelson wrote in 1970, "Dr. S. Dillon Ripley, secretary of the Smithsonian Institution, believes that in 25 years, somewhere between 75 and 80 percent of all the species of living animals will be extinct."

If we wanted to save species, reduce pollution and avoid running out of natural resources, it seemed that we had to do one thing above all else: stop growing. Perhaps the broadest idea coming out of Earth Day and the nascent environmental movement was degrowth: deliberate shrinkage—rather than expansion—of our populations and economies over time. Degrowth wouldn't be easy and it might not be popular with everyone, but it seemed like a necessity. Philosopher André Gorz spoke for many when he wrote in 1975, "The point is not to refrain from consuming more and more, but to consume less and less—there is no other way."

It's important to be very clear on the following: people and societies around the world have not em-

braced degrowth since Earth Day. Global economic and population did decelerate a bit after 1970, but this is largely because the 25 years after the end of World War II were a time of extraordinarily fast growth as countries rebuilt themselves. Except for that brief period, growth in the world's economies and populations has never in human history been as fast as in the years since 1970. Degrowth is nowhere to be found.

So what has happened with the three nasty side effects of growth: resource depletion, pollution and species loss? They must all have increased, just as populations and economies have, right?

Not at all. In the years since Earth Day, something weird and wonderful has happened: we ingenious humans figured out how to tread more lightly on our planet, even as we become more numerous and prosperous over time. This happy phenomenon is most advanced in the richest countries, but it's spreading around the world. Almost nobody anticipated that it would happen, and even today very few people are aware that the apparently iron-clad trade-off between human prosperity and the state of nature has been eased. But it has. To see this,

let's take another look at the three big problems.

First, resource depletion. The surest sign that something is becoming more scarce is that it's becoming less affordable. But without exception, important resources like fuels, minerals, and foods have been getting more affordable, not less, for the world's average worker (in other words, not just for people in rich countries). Researchers Marian Tupy and Gale Pooley have calculated this hypothetical worker's ability to buy each of 50 resources over time—everything from crude oil to coffee to cotton. They find that the same market basket of all 50 that could be bought with one hour of labor in 1980 could be bought with only a bit more than 20 minutes of work in 2018. Not a single resource became more “time expensive” to the world's average worker over this period.

How can this be? One of the most important reasons is that many if not most resources are not nearly as scarce as we used to think. 1972's *Limits to Growth* provides a fascinating demonstration of this because it included a list of the proven reserves of several nat-

now using less of them year after year. And not just less per person, but less in total. In the U.S., which accounts for about 25 percent of global GDP, annual consumption of resources as diverse as copper, paper, water for agriculture, timber, nitrogen (a critical fertilizer component) and cropland is now trending downward. In addition, total American energy use has been essentially flat since 2007, even as the economy has grown by almost 20 percent. Developing countries, including fast-growing ones such as India and China, are not yet dematerializing. But I predict that in the not-too-distant future they'll start decreasing their consumption of some resources, just as high-income countries have.

As I explain in my book *More from Less*, two powerful forces are combining to drive this dematerialization of the economy. The first is tech progress, especially progress with all things digital (think of how much better and lighter today's LCD computer screens are than the cathode ray tube [CRT] monitors that preceded them). The second is capitalism,

is the classic negative externality, or bad outcome from a transaction that affects people who are not part of the transaction. If a factory pollutes a nearby river with its waste, for example, people living downstream suffer even if they don't buy any of the factory's products. Competitive markets do a lot of things well, but they don't deal with externalities. Instead, they often create them. So governments need to step in by forbidding the pollution (as we've done with the chlorofluorocarbons that were responsible for the hole in the ozone layer), placing an upper limit on it, or placing a price on it.

ural resources, along with predictions about how long these resources would last under various scenarios. If exponential economic growth continued, one of the team's main computer models showed that the planet would run out of gold within twenty-nine years of 1972; silver within forty-two years; copper and petroleum within fifty; and aluminum within fifty-five.

These weren't accurate predictions. We still have gold and silver, and we still have large reserves of them. In fact, the reserves of both are actually much bigger than in 1972, despite almost half a century of additional consumption. Known global reserves of gold are almost 400 percent larger today than in 1972, and silver reserves are more than 200 percent larger. And it's probably not too early to say that we're not going to run out of copper, aluminum and petroleum as quickly as estimated in *Limits to Growth*. Known reserves of all are much larger than they were when the book was published.

One other thing to keep in mind about natural resources is that in much of the rich world we're

or intense competition among profit-seeking companies (think how much pressure CRT makers faced as LCDs took over their markets). This competition provides strong incentives for companies to save money on resources (after all, a penny saved is a penny earned) and tech progress provides plenty of opportunities to do exactly that. So internal combustion engines are simultaneously lighter, more powerful and more fuel-efficient; smartphones replace entire shelves full of devices; and the economy dematerializes in countless other ways.

It's true that we live on a finite planet. But when it comes to thinking about resource consumption and availability, this fact is essentially irrelevant. Our experience since Earth Day has demonstrated that our planet is easily vast enough to supply us with all the materials we'll need, for as long as we'll need them. The real danger is not that our growth will deplete the planet, but instead that it will be-foul it. So let's look at pollution next.

As every Economics 101 student learns, pollution

The logic of the latter approach is simple: if pollution is expensive, companies will work to reduce how much they spend on it, just like they work to reduce their spending on other materials. The cap-and-trade program adopted in the U.S. and other rich countries in recent decades to reduce atmospheric pollution is an attempt to reduce pollution by making it costly.

Cap and trade has been a huge success. As *Smithsonian* magazine summarized, it “continues to let polluters figure out the least expensive way to reduce their...emissions. As a result, the law costs utilities just \$3 billion annually, not \$25 billion [as they originally estimated]....It also generates an estimated \$122 billion a year in benefits from avoided death and illness, healthier lakes and forests and improved visibility on the Eastern Seaboard.”

The bans, limits, pricing programs and other pollution-control efforts established in high-income countries since Earth Day have been extraordinarily successful. They've caused pollution levels to go down in the rich world, even as economies and populations have continued to grow. The U.S. economy is more than two-and-a-half times as big as it was in 1970, yet atmospheric sulfur dioxide levels have declined by more than 90 percent, and other kinds of air, water and land pollution have also declined dramatically. A half-century ago, the conventional wisdom was that pollution was an unpleasant but unavoidable consequence of economic progress; as an American mayor said during debates in 1970 about strengthening the Clean Air Act, "if you want this town to grow, it has got to stink." But we now know that this is not true at all. To depollute, we don't have to embrace degrowth. We just have to put smart anti-pollution measures in place, then enforce them.

In recent decades, rich countries have done both. And what about low-income countries? Here the news is not as good. As researchers Hannah Ritchie and Max Roser summarize, "We see that the death rates [from air pollution] tend to be highest across Sub-Saharan Africa and South Asia...Outdoor air pollution tends to increase as countries industrialize and shift from low-to-middle incomes."

This is not a surprising finding. There's a hypothesis, based on the work of the economist Simon Kuznets, that low-income countries will pollute as their economies grew, but only up to a point. As people escape poverty and have more of their basic needs met, they will start to demand a cleaner environment. The government will respond to these demands, and overall pollution will start to go down, even as economic growth continues. This pattern of rising then falling pollution is known as the environmental Kuznets curve (EKC), and in recent years we've seen it with air pollution in China. In March of 2014, Premier Li Keqiang announced to the National People's Congress, "We will resolutely declare war against pollution as we declared war against poverty." The government mandated that coal plants reduce their emissions, shelved plans to build new ones in highly polluted regions and even removed coal furnaces from many homes and small businesses (without, in some cases, providing anything to replace them).

These efforts worked. Economist Michael Greenstone found reductions in fine-particulate pollu-

"Economic growth is at first the cause of pollution, then the cure for it. So to reduce pollution, we should encourage growth around the world."

tion of more than 30 percent throughout the country by 2018. He estimated that these reductions, if they were maintained, would add 2.4 years to the life of the average Chinese citizen. As Greenstone wrote, "It took about a dozen years [after passage of the 1970 Clean Air Act] and the 1981-1982 recession for the United States to achieve the 32 percent reduction China has achieved in just four years."

The EKC tells us something fundamental: that economic growth is at first the cause of pollution, then the cure for it. So to reduce pollution, we don't have to pursue degrowth; instead, we should encourage growth around the world. China's example gives us confidence that this approach works, and that growing countries will turn the corner and start polluting less in the years ahead. We all need this to happen, because some kinds of pollution are global, not local. For example, the huge amount of plastic trash in the world's oceans that doesn't come from ships comes mainly from rivers that flow through low-in-

come countries in Asia and Africa. The surest way to stop this flow of garbage is to make people in these countries prosperous enough that they can afford to care about the environment. We also need to ensure that rich countries don't start backsliding on their environmental successes. The Trump administration's moves to roll back wetlands protections, methane pollution standards and other safeguards are moves in the wrong direction, and should be reversed.

Of course, the greenhouse gases like carbon dioxide that cause global warming are the pollution most damaging to the long-term health of our planet and ourselves. Reducing future greenhouse-gas emissions is a major challenge, requiring political will and technological innovation. But it won't require any other radical departures from our current trajectory. Instead, the same approach that has worked for reducing other kinds of atmospheric pollution—namely, making it expensive—would also be effective at lowering greenhouse gas emis-

D- It is necessary for developing countries to pollute, but once they are developed, they implement green laws and pollute less.

2. Pick one argument or one topic from the text and comment on it.

sions. A carbon dividend is an ingenious way to both make greenhouse gases expensive and to help people afford the resulting price increases. This dividend is a tax on carbon with an important twist: instead of keeping the money collected from companies, the government sends it right back out to the people as a "dividend" to each household. William Nordhaus was one of the winners of the 2018 Nobel Prize in economics in large part for his work on the carbon dividend. Clearly, it's an idea whose time has come.

Species loss is one of the most heartbreaking predicted consequences of global warming. Our greenhouse gas emissions could make some habitats uninhabitable, adding more animals to the sad parade of those already eliminated by our actions. But the threat of extinctions doesn't imply a need for degrowth. Instead, it makes more urgent the opposite: a world of nations and people prosperous enough to be good stewards of our planet and the life on it. Over the past 50 years we've seen remarkable increases in this kind of stewardship. In 1982, for example, most nations agreed to a complete moratorium on the hunting of whales, and populations are rebounding. In addition to protecting species, we're also protecting territory. In 1970, less than 2.4 percent of the earth's land area was designated as parkland or otherwise conserved, and only 0.04 percent of the world's waters. By 2018

these figures had increased to 13.4 percent and 7.3 percent, respectively. In China, which has long been the world's largest market for endangered animal products, another important EKC has taken shape. As the country got wealthier, it eventually applied less pressure, not more, to some important animals. Strict bans are in place on buying, selling and possessing rhino and tiger products, and trade in ivory has been prohibited since 2017.

Are efforts like these helping in the fight against extinctions? They are. Documented extinctions appear to have slowed down in recent decades; for example, no marine creatures have been recorded as extinct in the past fifty years. It is far too early to declare victory over the forces of annihilation, but not too early to say that we know what works. Less pollution and

more protection and prosperity are core elements of a winning strategy for protecting life on Earth.

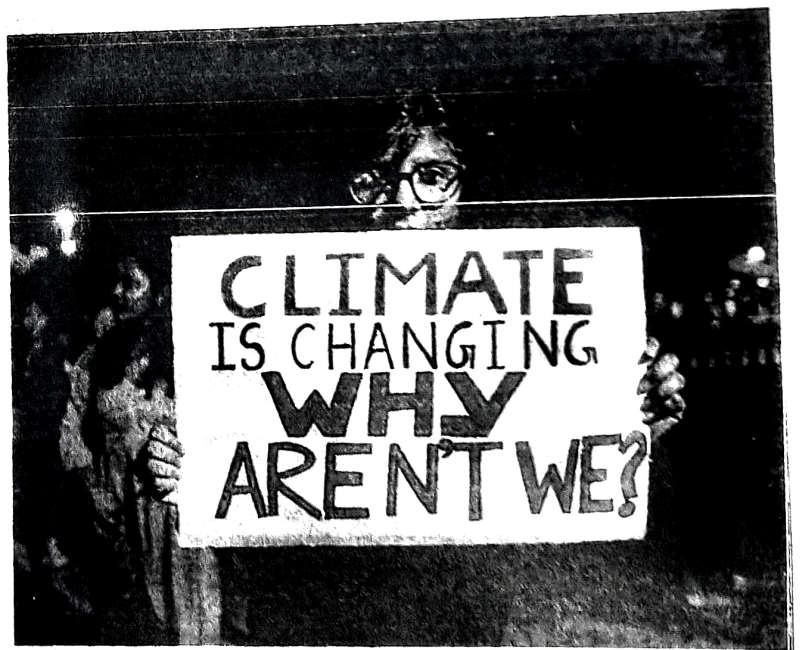
Degrowth is not. The past half century has exposed it as an unreasonable idea (given human nature), and an unnecessary one. This is not the same as saying that environmentalism is unnecessary. We should all be deeply grateful to the modern environmental movement born around Earth Day. On that day and countless others, concerned people took to the streets; put pressure on businesses, policymakers and elected officials; and otherwise advocated that we take better care of the planet we all live on. It worked.

But gratitude toward environmentalism does not mean continuing to support all of its original ideas. We now know that the core idea of degrowth—that there is no other way to conserve the earth for future generations—is simply wrong. With a few smart moves, including limiting pollution and protecting vulnerable species, we can have both greater human prosperity and a healthy, endlessly abundant planet. So let's get to work on building one. ■

→ **Andrew McAfee** is a scientist at MIT and the author of *MORE FROM LESS: THE SURPRISING STORY OF HOW WE LEARNED TO PROSPER USING FEWER RESOURCES—AND WHAT HAPPENS NEXT*, from which portions of this essay are adapted.

DRIVING DEGROWTH
Developing countries, including fast-growing ones such as India and China, are not yet dematerializing. But in the not-too-distant future, they may start decreasing their consumption of some resources, just as high-income countries have. Much of the rich world is now using less natural resources each year. One factor driving dematerialization of developed and developing countries alike is technological progress. Another is competition among profit-seeking companies, which provides incentives for companies to save money on resources.

Left: Bicycle riders battle smog in New Delhi, India.
Right: A protest against governmental inaction, climate change and pollution in Hyderabad.



1) What is the journalist's main argument?

A- With technological advance we consume less and therefore we pollute less.

B- To a certain extent, growth is beneficial to the planet: sustainable development is possible.

C- The polluter-pay principle is the most efficient policy to reduce pollution.