THE *SUNDAY TIMES* BESTSELLER

HANNAH RITCHIE

Not the End of the World

Surprising facts, dangerous myths and hopeful solutions for our future on planet Earth

'Truly essential'
Margaret Atwood

'Shines with positivity'
Rutger Bregman

'Uplifting'
The Times

'Inspiring'
David Wallace-Wells



‘An inspiring data-mine which gives us not only real guidance, but the most necessary ingredient of all: hope’ Margaret Atwood, TED2023

‘There is real peril in our widespread failure to understand just how much human lives have been improved through societal efforts . . . As Ritchie demonstrates, a better future for both people and planet is possible and even achievable’ *Science*

‘With comprehensive data and sometimes counterintuitive conclusions, Hannah Ritchie does for the environment what Hans Rosling did for health . . . I hope people around the world read this book, understand our planet isn’t a lost cause, and get inspired to help fix it’ Bill Gates

‘It is rare to find a book covering climate change with such an optimistic message . . . An admirable feat . . . A highly readable guide to fixing the planet’ *New Scientist*

‘Invigorating, inspiring, often surprising’ David Wallace-Wells

‘Hopeful . . . highly readable’ *Financial Times*

‘Ritchie makes it clear that progress is already happening . . . Now, we must keep that momentum going’ *New Statesman*

‘It shines with practicality and positivity . . . Let’s get it into the hands of as many policymakers, politicians and fellow citizens as possible’ Rutger Bregman

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‘Useful, timely and inspiring’ *Literary Review*

‘Such a clear-eyed view of the state we’re in’ Tim Harford

‘Ritchie has learned well from Rosling and her book is among the most accessible I have read. She faces down the doom-mongers by assessing the evidence on seven distinct but overlapping crises’ *Irish Independent*

‘A refreshing perspective on the problems that the world face, providing plenty of optimism while not sugarcoating the deep structural challenges at the root of it all’ Helen Czerski

‘Is there any room for hope amid the doom-laden headlines about the environment? Emphatically yes, argues data scientist Ritchie’ *Guardian*

‘Data is a superpower. Let Hannah Ritchie show you the world as it really is. Then go out and change it for the better’ Mark Lynas

‘Ritchie’s unique variety of critical-minded, solution-focused optimism is beautifully systematic’ *Irish Times*

‘A refreshingly upbeat guide to achieving sustainability’ Gaia Vince

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HANNAH RITCHIE

Dr Hannah Ritchie is senior researcher in the Programme for Global Development at the University of Oxford, and an honorary fellow at the University of Edinburgh. She is also deputy editor at the highly influential online publication *Our World in Data*, which brings together the latest data and research on the world's largest problems and makes it accessible for a general audience. Her research appears regularly on the BBC and in the *New York Times*, *The Economist*, *Financial Times*, *WIRED*, *New Scientist* and *Vox*. In 2022, Ritchie was named Scotland's Youth Climate Champion and *New Scientist* called her 'The woman who gave COVID-19 data to the world'. In 2023 she was named in *Vox*'s 'Future Perfect 50' list of scientists, thinkers and activists trying to make the world a better place.

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For my parents,
the perfect mix of heart and mind

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Introduction

It has become common to tell kids that they're going to die from climate change. If a heatwave doesn't get them then a wildfire will. Or a hurricane, a flood, or mass starvation. Incredibly, many of us hardly blink before telling our children this story. It shouldn't, then, come as a surprise that most young people think their future is in peril. There is an intense feeling of anxiety and dread about what the planet has in store for us.

I see this daily in the emails that land in my inbox. But it's also reflected in research from across the world.[1] A recent global survey asked 10,000 16- to 25-year-olds about their attitudes to climate change.[2] More than three-quarters thought the future was frightening, and more than half said 'humanity was doomed'. The feelings of pessimism were widespread, from the UK and US to India and Nigeria. Regardless of wealth or security, young people the world over feel like they're hanging on for dear life.

In the same survey, two in five were hesitant to have children. In a 2020 poll of American adults (of all ages) without children, 11% said climate change was a 'major reason' for not having them, and 15% more said it was a 'minor reason'.[3] In younger adults, aged 18 to 34, the share was even higher. One respondent said she felt 'like I can't in good conscience bring a child into this world and force them to try to survive what may be apocalyptic conditions'.[4] Of those surveyed, 6% said they regretted having children because they felt despair about their future in a changing climate.

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It's tempting to dismiss these views as empty words. But a recent study, not looking at surveys but actual data on people's reproductive decisions, suggests non-environmentalists are 60% more likely to have children than committed ones.[5] Of course, this may not be the *only* reason environmentalists are less likely to have children, but it gives us some concrete evidence that when people say they're anxious about having kids, they're not bluffing. If people aren't bluffing about their hesitation to have kids, they're probably not bluffing about their feelings of doom and anxiety either.

Closer to home, I know these feelings are real, because I've been there. I too used to be convinced that I didn't have a future left to live for.

How to turn the world upside down

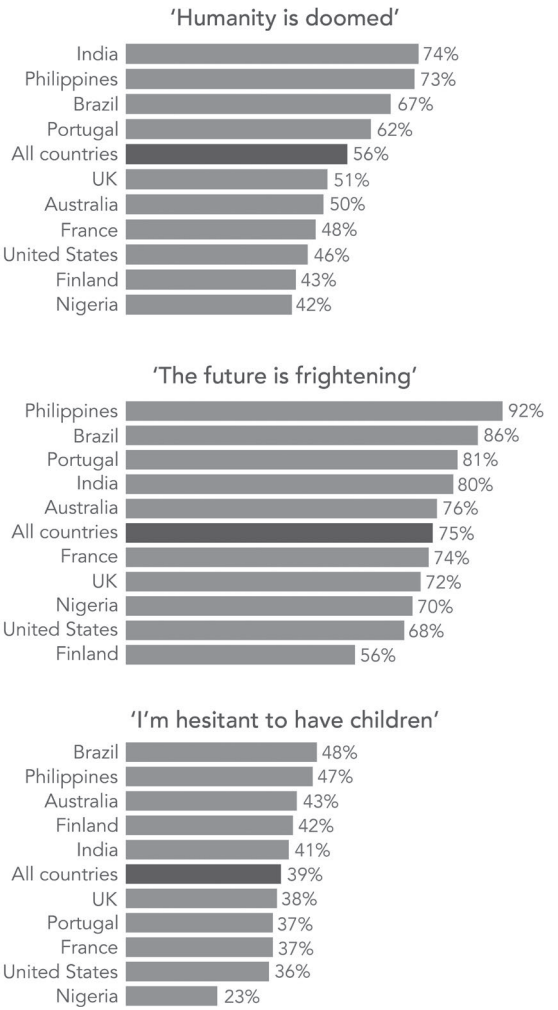
I spend most of my time thinking about the world's environmental problems. It's my job and my passion, but I nearly gave up on it.

In 2010 I started my degree in Environmental Geoscience at the University of Edinburgh. I showed up as a fresh-faced 16-year-old, ready to learn how we were going to fix some of the world's biggest challenges. Four years later, I left with no solutions. Instead, I felt the deadweight of endless unsolvable problems. Each day at Edinburgh was a constant reminder of how humanity was ravaging the planet. Global warming, sea-level rise, ocean acidification, dead coral reefs, starving polar bears, deforestation, acid rain, air pollution, overfishing, oil spills and the annihilation of the world's ecosystems. I don't remember hearing about a single positive trend.

During my time at university, I made a conscious effort to keep up with the news. I needed to be informed about the state of the world. Everywhere were images of natural disasters, droughts and hungry faces. More people seemed to be dying than ever before, more were living in poverty, and more children were starving than at any time in history. I believed I was living through humanity's most tragic period.

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Many young people think the world is doomed due to climate change
Share of young people, aged 16 to 25 years old, who agreed with the following statements about our future due to climate change.



As will be seen, all of these assumptions were wrong. In fact, in nearly every case the world was moving in the opposite direction. You might think such basic misconceptions would be squashed

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during a four-year stint at a world-leading university. They weren't. If anything, they became even more ingrained, the shame of our ecological sins getting heavier with every lecture.

Those years made me feel helpless. Despite working relentlessly to get my degree, I was ready to turn my back on my obsession and find a new career path. I started applying for jobs far away from environmental science. Then, one evening, everything changed. I saw bubbles darting across the television screen. A small man was chasing after them.

'In my lifetime former colonies gained independence and finally they started to get healthier, and healthier and healthier. Now here they come! Countries in Asia and Latin America start to catch up with the Western countries.' The bubbles were red and green and superimposed on a graph that looked almost holographic. The man started waving his arms around, pushing and then dragging the bubbles across the screen. His excitement made it hard to pin down his accent but I thought he might be Swedish. 'And here Africa comes!' he shouted.

The man was Hans Rosling. If you know of him already, you can probably remember the first time you were introduced. If you don't, I'm a bit jealous: you still have the chance to discover his magic for the first time. Rosling was a Swedish physician, statistician and public speaker. A review of his work in *Nature* captures him well: 'Three minutes with Hans Rosling will change your mind about the world.'[6] It changed mine.

You see, my understanding of the world was wrong. Not just slightly wrong. I'd assumed *everything* was getting worse. Yet here was Rosling, leaping across the stage, showing me facts rooted in solid data. He was telling me that I had it all the wrong way round. But he did it in a way that meant I didn't feel like an idiot. I was *supposed* to get it all wrong. Everyone does. This became his main act. He would get crowds of intellectuals, business leaders, scientists, and even global health experts at TED, Google or the World Bank, and he'd show them that they were completely ignorant of the most basic facts about the world. And they'd love it! Watch his

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videos and you can hear the audience laughing at their own ignorance. He had a generosity as a teacher that is impossible to replicate.

In his lectures, Rosling explained what the data really told us about the most important metrics of human well-being: the percentage of people living in extreme poverty, the number of children dying, how many girls did or didn't get to go to school, and what percentage of children are vaccinated against diseases. We almost never step back to look at the data on these changes in global development. Instead, we watch the daily news and those headlines become part of our world view. But doing this doesn't work. The news is designed to tell us, well, something *new* – an individual story, a rare event, the latest disaster. Because we see them in the news so often, unlikely events seem like probable ones. But they're often not. That's why they make the news and why they capture our attention.

These individual events and stories are important. They serve a purpose. But it's a terrible way to understand the bigger picture. Many changes that do profoundly shape the world are not rare, exciting or headline-grabbing. They are persistent things that happen day by day and year by year until decades pass and the world has been altered beyond recognition.

The only way to really see these changes is to step back and look at the long-run data. This is what Hans Rosling did for social problems. The same is true for our environmental ones. I've been researching, writing and shouting about these trends for almost a decade now. I'm Head of Research at Our World in Data, where we do this for every single one of the world's big problems – from poverty and health to war and climate change. I'm also a misfit scientist at the University of Oxford. We're 'misfits' because we do the opposite of what people expect academics to do. Researchers tend to zoom into a problem, to get as close as possible and pick it apart. We zoom out.

My job is not to do original studies, or to make scientific breakthroughs. It's to understand *what we already know*. Or *could* know if we studied the information we have properly. Then explain it to people: in articles, on the radio, on TV, and in government offices so they can use it to move us forward.

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Just as Hans Rosling showed that news headlines don't teach us much about global poverty, education or health, I've found that trying to build an environmental world view based on the latest wildfire or hurricane is no good. Trying to understand the world's energy system and how to fix it from the latest breaking story won't get us anywhere.

If we want clarity we have to take in the full picture, and that means giving ourselves some distance. If we take several steps back, we can see something truly radical, game-changing and life-giving: humanity is in a truly unique position to build a sustainable world.

Why doomsday thinking is so damaging

'We need people to wake up. We need people to start paying attention!' People often say that is why the apocalyptic environmental story needs to be shared far and wide. Or, as they argue, the apocalyptic *truth*. I get it. On many environmental issues, we've been sleepwalking for a long time. We've pushed action further and further into the future – happy to do so because it can take decades or more for environmental impacts to hit us. Except the decades have passed and now we are here. The impacts have arrived: it's already happening.

To get this out of the way, let me make one thing absolutely clear: I'm no climate change denialist or minimiser. I spend my life – inside and outside work – researching, writing and trying to understand our environmental problems and how to solve them. The world has lacked urgency to act. Bringing attention to the magnitude of potential impacts is essential if we want things to change. But that is a long way from telling kids they're ruined.

Let's, for now, say that total doom is an exaggeration. Does that really do *harm*? If it makes people take these issues seriously, that can only be a good thing, surely, and the exaggeration simply acts as a counterbalance to those who underplay the issue. But I'm convinced that there is a better, more optimistic and honest way forward.

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There are several reasons why I think these doomsday messages do more harm than good. First, the doom narratives are often untrue. I don't expect you to believe me on that straight away, but I hope that by the end of the book I will have convinced you that while these problems are big and pressing, they are solvable. We will have a future. By 'we' I mean us, collectively, as a species. Yes, many people could be severely impacted, or even have that future taken away from them, so it's up to us to decide *how many* people, based on the actions we take. If you believe people have the right to the truth, then you should be against these exaggerated doomsday stories.

Second, it makes scientists look like idiots. Every doomsday activist that makes a big, bold claim invariably turns out to be wrong. Every time this happens it chisels another bit of public trust away from scientists. It plays right into the hands of deniers. When the world *doesn't* end in 10 years, deniers turn around and say, 'Hey, look, the crazy scientists got it wrong again. Why should anyone listen to them?' In nearly every chapter of this book I'll list doomsday claims that turned out to be completely untrue.

Third, and perhaps most importantly, our impending doom leaves us feeling paralysed. If we're already screwed, then what's the point in trying? Far from making us more effective in driving change, it robs us of any motivation to do so. I recognise this from my own dark period when I nearly walked away from the field entirely. I can assure you that after reframing how I saw the world, I have had a *much*, *much* bigger impact on changing things. When it comes down to it, doomsday attitudes are often no better than denial.

This option of 'giving up' is only possible from a place of privilege. Let's say we stop trying and temperatures climb by another degree or two, taking us well past our climate targets. If you live in a wealthy country, you'll probably be okay. It won't be plain sailing, but you can buy your way out of serious danger. That's not true for many less fortunate people, though. Those in poorer countries cannot afford to protect themselves. Accepting defeat on climate change is an indefensibly selfish position to take.

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Climate scientists are not accepting defeat. Most climate scientists

I know have children. They spend every day studying and thinking about climate change. Yet they're obviously not resigned to the idea that we will face a climate apocalypse in the next century. They think there is still time to ensure a liveable future for their children. As Dr Kate Marvel, a climate scientist at NASA, puts it: 'I unequivocally reject, scientifically and personally, the notion that children are somehow doomed to an unhappy life.'[7]

It's not that they don't think the impacts of climate change are worrying. If they didn't, they wouldn't be working on them. They also don't think the world is doing enough to tackle it – they've been begging people to act for decades. Nearly every one of them will say that we are moving too slowly, and if we don't get our act together, things could get very bad. Why, then, are they optimistic that we can still do something? There are several possible reasons. One is that there has been a miscommunication about what our climate targets – of 1.5°C and 2°C – actually mean. It is wrong to think of these as *thresholds* – that as soon as we pass 1.5°C, we're toast. That's not true. There is nothing special about the number 1.5°C; it's not that things are liveable at 1.499°C and as soon as we hit 1.501°C the planet becomes unbearable. There is a significant increase in the risk of tipping points and non-linear climate impacts once we start to get into the 1.5°C–2°C range. But that doesn't make 1.5°C an all-or-nothing threshold. In fact, it makes every 0.1°C even more important once we start to move into that zone. The difference is that many climate scientists view these numbers as *targets*. It would be incredible to meet them, but we need to keep going even if we don't.

This might seem like a pedantic point, but it's an important one. The reality is that we're almost certainly going to pass 1.5°C. Most climate scientists expect that. So, if people view it as an end-of-the-world threshold then *of course* it's going to feel apocalyptic.

Another reason some climate scientists are less pessimistic is that they believe that things can change. The last few decades have been an uphill battle for them. They've been mostly ignored. Often *they* were the ones framed as apocalyptic scaremongers. But, finally, the world has woken up to the reality of climate change, and people are

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taking action. The climate scientists know change is possible because they've seen it happen. Against the odds, they've driven much of it.

The world needs more urgent optimism

I used to think optimists were naive and pessimists were smart. Pessimism seemed like an essential feature of a scientist: the basis of science is to challenge every result, to pick theories apart to see which ones stand up. I thought cynicism was one of its founding principles.

Maybe there is some truth to that. But science is inherently optimistic too. How else would we describe the willingness to try experiments over and over, often with slim odds of success? Scientific progress can be frustratingly slow: the best minds can dedicate their entire lives to a single question and come away with nothing. They do so with the hope that a breakthrough might be round the corner. It's unlikely *they* will be the person to discover it, but there's a chance. Those odds drop to zero if they give up.

Nevertheless, pessimism still sounds intelligent and optimism dumb. I often feel embarrassed to admit that I'm an optimist. I imagine it knocks me down a peg or two in people's estimations. But the world desperately needs more optimism. The problem is that people mistake optimism for 'blind optimism', the unfounded faith that things will just get better. Blind optimism really is dumb. And dangerous. If we sit back and do nothing, things will not turn out fine. That's not the kind of optimism that I'm talking about.

Optimism is seeing challenges as opportunities to make progress; it's having the confidence that there are things we can do to make a difference. We can shape the future, and we can build a great one if we want to. The economist Paul Romer makes this distinction nicely.[8] He separates 'complacent optimism' from 'conditional optimism':

> Complacent optimism is the feeling of a child waiting for presents. Conditional optimism is the feeling of a child who is thinking about building a treehouse. 'If I get some wood and nails and persuade

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some other kids to help do the work, we can end up with something really cool.'

I've heard various other terms for this 'conditional' or effective optimism: 'urgent optimism', 'pragmatic optimism', 'realistic optimism', 'impatient optimism'. All these terms are grounded in inspiration and action.

The reason pessimists often *sound* smart is that they can avoid being 'wrong' by moving the goalposts. When a doomer predicts that the world will end in five years, and it doesn't, they just move the date. The American biologist Paul R. Ehrlich* – author of the 1968 book *The Population Bomb* – has been doing this for decades.[9] In 1970 he said that 'sometime in the next 15 years, the end will come. And by "the end" I mean an utter breakdown of the capacity of the planet to support humanity.' Of course, that was woefully wrong. He had another go: he said that 'England will not exist in the year 2000'. Wrong again. Ehrlich will keep pushing this deadline back. A pessimistic stance is a safe one.

Don't mistake criticism for pessimism. Criticism is *essential* for an effective optimist. We need to work through ideas to find the most promising ones. Most innovators that have changed the world have been optimists, even if they didn't identify as one. But they were also fiercely critical: no one picks apart the ideas of Thomas Edison, Alexander Fleming, Marie Curie or Norman Borlaug more than they did themselves.

If we want to get serious about tackling the world's environmental problems, we need to be more optimistic. We need to believe that it *is* possible to tackle them. As we'll see in the chapters that follow, this is not a pipe dream: things *are* changing, and we should be impatient about changing them faster.

* Paul R. Ehrlich is an American biologist. He's not to be confused with Paul Ehrlich, the German physician who won the Nobel Prize for his contributions to immunology. The latter invented the cure for syphilis in the early 20th century, and saved many lives as a result. The same cannot be said for Paul R. Ehrlich.

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We can be the first generation to achieve a sustainable world

The Last Generation is an activist group in Germany, the name implying that our unsustainability will push us to extinction. To force their government into action, some of the group recently went on a month-long hunger strike. It wasn't a half-hearted effort: several ended up in hospital. They're not the only ones who feel this way. The global environmental group Extinction Rebellion is also founded on this principle. And the survey results earlier show that the notion of us being the 'last generation' isn't far from the minds of many young people.

But I'd like to take the opposite framing. I don't think we're going to be the last generation. The evidence points to the opposite. I think we could be the *first* generation. We have the opportunity to be the first generation that leaves the environment in a better state than we found it. The first generation in human history to achieve sustainability. (Yes, that seems hard to believe. Stay with me and I'll explain why.) Here I'm using the term 'generation' loosely. I am from a generation that will be defined by our environmental problems. I was a child when climate change really came on the radar. Most of my adulthood will be spent in the midst of the major energy transition. I will see countries move from being almost entirely dependent on fossil fuels to being free of them. I will be 57 when governments hit the '2050 deadline' of reaching net-zero carbon emissions that so many have promised. In writing this book, I feel like I am representing a generation of young people that want to see the world change.

But, of course, there will be several generations involved in this project. There are a couple above me – my parents and grandparents – and a couple below me, my future children (and perhaps grandchildren). Generations are often pitted against each other: older generations are blamed for ruining the planet; younger generations are framed as hysterical and indignant. When it comes down to it, though, most of us want to build a better world, where our children and

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grandchildren can thrive. And we all need to work together to achieve that. All of us will be involved in this transformation.

In *Not the End of the World*, I'll explain why I think we can be the first to achieve sustainability. I'll explore each of our environmental problems one by one, looking at its history, where we are today, and how we might lay out a path to a better future. Most chapters will open with a flashy – and damaging – headline that you might have seen before. I'll explain why each of them is wrong. We are overwhelmed with information about what we shouldn't be doing when it comes to the health of our planet. I'll pull out the big things that are really making a difference and which we should all focus on, and the things we should all stress less about.

We will start high up in the atmosphere and travel downwards, encountering the seven biggest environmental crises we must solve if we are to achieve sustainability. We'll look at air pollution first, followed by climate change. Then we'll move to ground level, covering deforestation, food and the life of other species on land. Next, we'll dip underwater, looking at ocean plastics, before finally plunging deep to explore the state of our world's fish.

Our environmental problems overlap. What we eat matters for climate change, deforestation and the health of other species on our planet. If we eat more food from farms on land, we put less pressure on fish in our oceans. Burning fossil fuels doesn't just drive climate change, it pollutes our air and damages our health. No environmental problem stands in isolation. I hope by the time you finish this book you will have a clearer understanding of this interconnectedness, the way some of the most important solutions at our disposal help address several problems at once – and just how valuable this is to our future.

Six things to keep in mind

The issues we'll explore are complex. They're uncomfortable. And, unfortunately, some of the arguments or data I put forward can be

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abused in the wrong hands. Here are six points to keep in mind as you read.

(1)
We face big and important environmental challenges

Surprisingly, on many environmental issues, some trends are moving in the right direction. In irresponsible hands, positive trends are often framed as 'see, relax, it's not a problem after all'.

This is not my position. The environmental challenges we face are massive. If we don't tackle them, the consequences will be devastating and cruelly unequal. We must act. It must be large-scale. And so much quicker than we have done before.

(2)
The fact that our environmental issues aren't humanity's largest existential risk doesn't mean we shouldn't work on them

I don't think climate change – or any other environmental problem – is going to wipe us out as a species. Risks that are much more likely to be existential are nuclear war, a global pandemic or artificial intelligence. Some have used this as an argument to focus less on climate change: 'Why are people working on that when they should be focused on dangerous pathogens or the threats of nuclear war?'

That's an odd way to think about it. There are eight billion of us – we can work on more than one or two problems at the same time. We might even argue that climate change increases the risk of some of these existential threats. Reduce the damage from climate change and we reduce other risks too.

Also, since when did a problem have to be existential for it to be serious enough to work on? The risks from environmental damage are severe: they're large enough to impact billions of people. And for much of the human population, it really *is* an existential risk.

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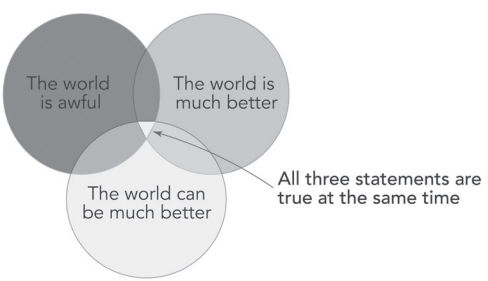
(3)
You will have to hold multiple thoughts at the same time

Doing this is essential if we're to see the world clearly and develop solutions that really make a difference. Things getting better does not mean our job is done.

As an example: since 1990 the number of children dying every year has more than halved. That is a tremendous achievement. But share this important fact online and you'll often get this response: 'Oh, so you think it's fine that 5 million children die every year?' *Of course not*. That fact is one of the worst things about our world. But the two facts do not contradict each other. We have made impressive progress, but we still have a long way to go. As my colleague Max Roser puts it: 'The world is much better; the world is still awful; the world can do much better.'[10] All three statements are true.

By denying the first – that we *have* made progress – we lose out on important lessons about how we keep moving forward. Denying this fact also robs us of the inspiration that change *is* possible.

If I have to caveat every positive trend with 'but I'm not saying that everything is perfect' then this book is going to be an exhausting and repetitive read. Just assume this is always the case. When I say things are improving, I am not saying they are fine as they are.



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(4)
None of this is inevitable, but it is possible

Alongside the history, and story of where we are today, I will propose a path forward. My suggestions are never predictions, they are possibilities.

That's an important distinction. I don't know what's going to happen in the future. It depends on how quickly we act, and whether we make good decisions. All I can do is lay out what I think our best options are. Hopefully this book will play a small role in inspiring us to take them.

(5)
We cannot afford to be complacent

The complacency trap is never far away. It's easy to take our foot off the pedal or to be led off course as new and short-term problems arise. We can't let this happen.

When Russia invaded Ukraine in 2022, many countries turned their back on Russian energy supplies, the price of energy rocketed and the global economy was shaken. Countries clambered to find other sources of energy, and some turned to coal, restarting their old plants.

This was a disappointing backslide on climate action. But it looks like it was a temporary one. After some months of higher CO_2 emissions, Europe's coal consumption has fallen again and its transition to renewables is as fast as ever. Russia's invasion of Ukraine has given governments even more reason to ditch fossil fuels and invest in low-carbon energy that they can control.

There are two important lessons here. The first is that, on our journey to a sustainable world, there will be blips along the way. Events that force us to stall, or maybe even regress, on fixing our environmental problems. We should expect this, and not panic when it happens. Where we end up is determined by what we do over the next few decades, not the next three months.

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The second is that we need to develop systems that are resilient to

world events that might throw us off course. When our economies run on fossil fuels, we're at the mercy of those that produce them.

(6)
You are not alone in this

I wish I could reach back to my younger self and hug her. For a long time, I felt alone in trying to grapple with these problems. The headwind got stronger and stronger.

If you currently feel this way, this book is me reaching out to you. To show you that you are not alone in this journey: there are *many* people who are working to build a better future. Some of them you see in the limelight. But most of them you don't: they are fighting in boardrooms to change company strategies; they are in governments trying to shape policies; they are engineering solar panels, turbines and batteries in labs; or they are in the field creating sustainable ways to grow food**.**

Look around and you will find people at all levels – from individuals in their local community to world leaders making consequential decisions – pushing into the headwind. Many are concerned but determined. Optimistic that what they do today will make a difference tomorrow.

When I started writing this book, I printed out a picture of my younger self and hung it next to my computer. This is the book that *I* needed a decade ago. It is a synthesis of nearly a decade of research and data that allowed me to see our environmental problems more clearly and gave me the perspective that helped me dig myself out of a very dark place. If you're currently there, I hope it gives you a way out too.

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1
Sustainability
A tale of two halves

The world has never been sustainable

Before we start our tour of environmental problems, I need to let you in on an unpopular truth: the world has never been sustainable. What we want to achieve has never been done before. To understand why, we need to look at what sustainability means.

The classic definition of sustainability came out of a landmark report from the United Nations. In 1987, the UN defined sustainable development as 'meeting the needs of the present without compromising the ability of future generations to meet their own needs'. That definition has two halves. The first is making sure that everyone in the world today – the present generations – can live a good and healthy life. The second half is about making sure that we live in a way that doesn't degrade the environment for future generations. We shouldn't create environmental damage that takes the opportunity of a good and healthy life away from our great-great-grandchildren.

This perspective is not without its controversy. Some definitions of sustainability *only* focus on the environmental component. The *Oxford English Dictionary* describes sustainability as 'the property of being environmentally sustainable; the degree to which a process or enterprise is able to be maintained or continued while avoiding the long-term depletion of natural resources'. That is a fancy way of saying: 'make sure that what you're doing today does not damage the environment for tomorrow'. In some definitions there's no requirement for humans to meet their own needs at the same time.

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As an environmentalist, I also put most of my focus on the second half: limiting the damage to our planet. But on a moral level, I cannot ignore the first half of the equation. A world full of avoidable human suffering does not meet our definition of sustainability.

A lot of the controversy about these definitions is because we assume there is an unavoidable trade-off between the first and second half. It's human well-being *or* environmental protection. That means one must be prioritised over the other, and for 'sustainability' it's the environment that wins. This trade-off existed in the past. But the central argument throughout this book is that this conflict does not have to exist in our future. There *are* ways to achieve both at the same time, which means there should increasingly be less conflict between the definitions. So, if you still want to adopt an environment-only definition, then think of human flourishing as a nice add-on.

The world has never been sustainable because we've never achieved both halves at the same time. If we only focus on the second half, it might seem like the world has become unsustainable in the very recent past, when carbon emissions, energy use and overfishing accelerated. We think that the world *used* to be sustainable, but our environmental damage has kicked things out of balance. That's the wrong conclusion. For thousands of years – more so since the agricultural revolution, but also before then – humans haven't been environmentally sustainable. Our ancestors hunted hundreds of the largest animals to extinction, polluted the air from burning wood, crop wastes and charcoal, and cut down huge amounts of forest for energy and farmland.[1–3]

It's true that there have been periods or communities that have achieved a harmonious balance with other species and the environment around them. Many indigenous groups have managed this, as well as being protective of biodiversity and the ecosystems.[4,5] Respect for the Earth lies at the heart of indigenous principles. As the Native American proverb goes: 'Take only what you need and leave the land as you found it.' Similarly, the ancient Kenyan proverb: 'Treat the Earth well: it was not given to you by your parents, it

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was loaned to you by your children.' Our understanding of sustainability starts there. The modern definitions are academic and uptight versions of these beautiful proverbs.

But communities that achieved environmental sustainability were always small, and that's because rates of child mortality were high: losing children stopped the population from growing.

A world in which half of all children die is not meeting 'the needs of the present generations' and is therefore not a sustainable one.

That's the challenge we face. We need to make sure that everyone in the world can live a good life *and* we need to reduce our environmental impacts so that future generations can flourish too. That puts us in uncharted territory. No previous generation had the knowledge, technology, political systems, or international cooperation to do both at the same time. We have the opportunity to be the first generation that achieves sustainability. Let's take it.

There is no better time to be alive than today

Having thought I was living through humanity's most tragic period, I now believe I'm living through its best. There has never been a better time to be alive. If someone had told me that eight years ago, I would have scoffed. In fact, when I heard Hans Rosling say it on-screen for the first time, I nearly stopped watching. What planet was he living on?

But it's true. And I hope that looking at the data and progress of seven key measures of well-being will help change your mind.

(1)
Child mortality

Stopping children from dying has been humanity's greatest achievement. The majority of us think there's a natural order to death: it's the old not the young that die. But this sequence is a very recent

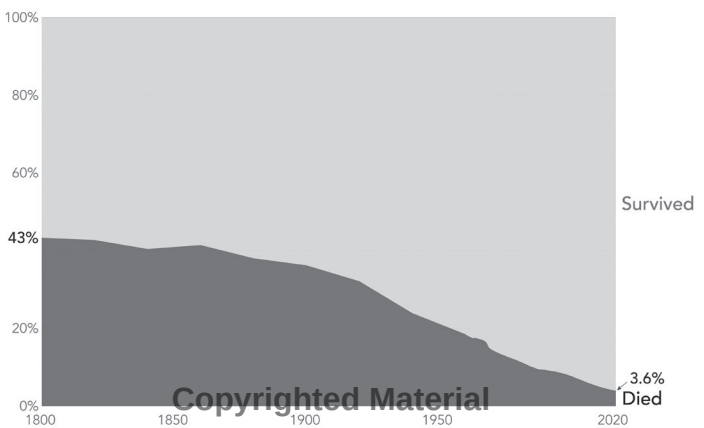
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development. The prospect that a child would outlive its parents is not a 'natural' occurrence at all: it's something that we've had to fight hard for.

For most of human history, your odds of living to adulthood were 50–50. Around a quarter of children would die before their first birthday, and another quarter died before they reached puberty.[6] There was no exception to this. Children dying was commonplace, regardless of continent or century.[7] Even the elite couldn't buy their children a path to adulthood. The Roman emperor Marcus Aurelius had fourteen children. Nine of them died before he did. Charles Darwin lost three of his children. This rate was also found in hunter-gatherer societies. Researchers looking at mortality rates across 20 different studies in modern hunter-gatherers and archaeological records found that at least a quarter died in infancy, and half died before reaching puberty.[8]

Until the last few centuries, there was almost no way for us to stop children from dying. It wasn't until the rise of clean water, proper sanitary conditions, vaccines, better nutrition and other advances in

Stopping children from dying is a very recent achievement
The global child mortality rate, which is the share of newborns that die before reaching their 5th birthday.



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health care that rates of child mortality started to plummet. As recently as 1800, about 43% of the world's children died before reaching their fifth birthday.[9] Today that figure is 4% – still woefully high, but more than 10-fold lower.

It would be wrong to think that this has only happened in rich countries. *Every* single country has made massive progress in the last fifty years. In 1950s Mali, 43% of newborns would die before reaching the age of five. Now, 10% do. India and Bangladesh have both reduced child mortality from around one in three to less than one in 30.

It's not just the *share* that is falling; the *number* of children dying is too. The year I was born – 1993 – almost 12 million children under the age of five died. Since then, this number has more than halved. We still have a lot of work to do – five million children dying every year is a tragedy – but we have achieved the unthinkable: our ancestors could never have imagined a world where the death of a child was so rare.

(2)
Mothers dying

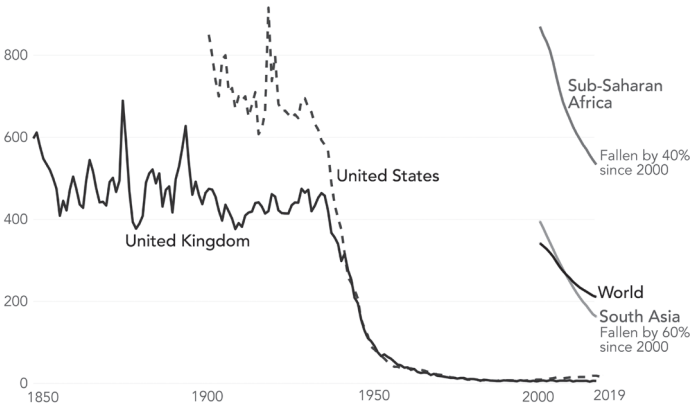
When my mum went through a complicated birth with my brother, she was told by my great-grandmother: 'If it had been back in my day, dear, you would have just died.' In just a few generations we've made pregnancy tens – in some countries, hundreds – of times safer.[10]

My mum's odds of dying in childbirth were around 1 in 10,000.* My grandmother's odds were more than twice as high. My great-grandmother's were a staggering 30 times higher. In most countries today, the chances that a woman will die from causes related to pregnancy are very low.

* I'm using data from the United Kingdom here. These national averages don't directly reflect personal risk to my mother, and the women that came before her, but it gives us a decent proxy for the chances.

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Mothers dying: maternal mortality rates have plummeted in recent centuries
The number of women who die from pregnancy-related causes per 100,000 live births.



(3)
Life expectancy

Until the 19th century, the average life expectancy at birth in the UK was between 30 and 40 years.[11] Even by the turn of the 20th century, it was just 50 years. By the middle of the century, it was 70 years. In 2019, the average life expectancy was over 80 years old. Within 200 years, life expectancy has doubled.* And this improvement is not

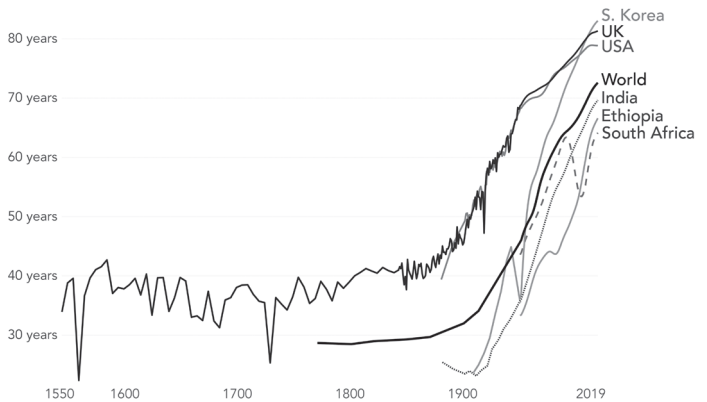
* Here it's useful to clarify what 'life expectancy' means. It refers to the number of years a person can expect to live. There are two common ways of measuring life expectancy. *Cohort life expectancy* is the average life length of a cohort – a group of individuals born in a given year. When we can track a group of people born in a particular year and track the exact date on which each one of them died then we can calculate this cohort's life expectancy: it's the average of the ages of all members when they died. This is quite hard to do: we need to follow an entire group of individuals through to the end of their life. Instead, a more common measure is *period life expectancy*. This estimates the average length of life for a cohort of people if they were exposed, from birth to death, to the mortality rates observed in any given year. Period life expectancy doesn't take future changes in life expectancy into account. When we report life expectancy here, we're talking about period life expectancy.

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'just' because we've managed to reduce child mortality. It has improved at all ages.

Again, this progress has been seen across the world. Globally, average life expectancy has increased from around 30 to more than 70 since the start of the 20th century. In the poorest countries too, life expectancy has improved substantially. In Kenya, Ethiopia and Gabon, it's 67 years. The average across sub-Saharan Africa as a whole is 63 years.

People are living longer across all regions of the world
Life expectancy at birth is the average number of years a newborn would live to if age-specific death rates stayed at their current level.



(4)
Hunger and malnutrition

For most of human history, every day for our ancestors was a fight to feed the family. Crop yields were low and supply was tight. One bad season – a drought, a flood or a pest invasion – and everyone could be left starving.

Food insecurity and famine were common. It's possible that prior to the agricultural transition, many tribes and communities had

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ample nutrition. We just don't know. What we do know is that after the advent of farming, and as small groups grew into villages, food supplies were unpredictable. There were more mouths to feed, less scope for travelling to find supplies, and yields from the fields were often at the mercy of the seasonal weather. It seemed like there was no way of preventing famine and hunger. This all changed in the last decades of the 20th century. Despite several devastating famines, technological advances in agriculture made it much more productive and allowed people to break free from a subsistence lifestyle.

In the 1970s, around 35% of people in developing countries did not get enough calories to eat. By 2015, this had fallen by almost two-thirds to just 13%. Many still face huge problems. In 2021, around 770 million people in the world – almost one in 10 – did not get enough food.[12] But it doesn't have to be this way. The world now produces far, far more food than it needs. Many countries have come close to eradicating hunger. We need to make sure that every country can do the same.

(5)
Access to basic resources: clean water, energy, sanitation

For most of human history, we'd take water from the river, a stream or lake, and it was a lucky draw as to whether it was clean or not. Disease was rife. Children died from diarrhoeal diseases and infection – many in poor countries still do. Getting access to clean water sources, sanitation and hygiene has saved tens of millions of lives every year, if not more.

In 2020, 75% had access to a water source that was clean and safe – up from just 60% in the year 2000[13] – and 90% of the world had access to electricity.[14] Some might see electricity as a luxury – an unnecessary drain on natural resources – but it has become essential for a healthy and productive life. We need it to keep vaccines and medicines cold; to keep our hospital machines running; to cook

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