

We also need to **BE HONEST—THIS IS TOUGH**. Psychotherapists argue that the real challenge is that climate change generates strong feelings that can, unless recognized, lead us to disavowal and outright denial. We need to **RECOGNIZE PEOPLE'S FEELINGS OF GRIEF AND ANXIETY**, and acknowledge and provide space for contradiction, ambivalence, loss, and mourning.

The starting point could be providing the space for people to openly acknowledge their feelings and share them. We need to **MOURN WHAT IS LOST, VALUE WHAT REMAINS**. And not just the natural world; we need to **MOURN THE END OF THE FOSSIL FUELS AGE**, which, for all of its dirt and danger, was also exceptionally affluent, mobile, and exciting. The low-carbon world will have new pleasures, but no longer the sweet roar of the Ford Mustang V8.

We should all **BE GLAD TO BE A POLLYANNA**. She has become synonymous with dim-witted optimism, but in the original books by Eleanor H. Porter, the character is clearly shown to be coping with immense grief and suffering through her gratitude for what she does have—her friends, community, and the joy of being alive.

What is clear is that this is a fast-moving issue and everything will change. At present, climate change exists largely as a narrative of anticipation shaped by familiar experience and existing frames. But momentous shifts are under way in the world's climate systems and carbon cycles, which will, within a single lifetime, make climate change entirely real, salient, and unavoidable. This will be a new world in which past certainties will disappear and our inbuilt social and psychological biases will become increasingly influential on our judgment.

This is why current responses are so important. **REMEMBER THAT HOW WE RESPOND NOW WILL PROVIDE THE TEMPLATE FOR FUTURE RESPONSES**. Acceptance, compassion, cooperation, and empathy will produce very different outcomes than aggression, competition, blame, and denial. We hold both futures within ourselves and, as we choose whether and how to think about climate change, we are choosing how we will think about ourselves and the new world we are creating.

## Four Degrees

### *Why This Book Is Important*

IN THE INTRODUCTION TO THIS book I pledged that it would not contain information on the impacts of climate change until its final chapter. Later I discussed how scientists struggled to maintain their composure in the face of the information that they held. In particular I mentioned their anxiety that average global temperatures might rise over the threshold of 4 degrees Celsius (7.2 degrees Fahrenheit).

For many years their attention was focused on lower outcomes—especially around two degrees, the level that was adopted by policy makers, somewhat arbitrarily, as the boundary level for “dangerous” climate change. In recent years, though, scientists have become far more willing to warn that four degrees is the actual future we face. Professor Robert Watson, the co-chair of the IPCC, was the first to break ranks in 2008 when he publicly warned governments that they needed to develop adaptation plans for four degrees. The following year international experts met for the first time to present detailed scenarios at the “4 Degrees and Beyond” conference at Oxford University. By 2013, there was sufficient agreement that Mark Maslin, professor of climatology at University College London, could tell the Warsaw climate negotiations, “We are already planning for a 4°C world because that is where we are heading. I do not know of any scientists who do not believe that.”

Four degrees is also increasingly on the minds of senior policy makers. The International Energy Agency reports that current emissions figures

put us on course for four degrees. In 2012 the World Bank, hardly a radical environmental organization, produced a major report with the title "Why a 4°C Warmer World Must be Avoided." In his introduction the Bank's president, Dr. Jim Yong Kim, said that he would ensure that "all our work, all our thinking, is designed with the threat of a 4°C degree world in mind."

So what does four degrees mean? Scientists, who are, as a group, extremely wary of exaggeration, nonetheless keep using the same word: *catastrophe*. Professor Steven Sherwood, a meteorologist at the University of New South Wales, Australia, says that it would be "catastrophic," making life "difficult, if not impossible," in most of the tropics. Professor Kevin Anderson, the former director of the Tyndall Centre for Climate Change Research, says that it is hard to find *any* scientist who considers four degrees "as anything other than catastrophic for both human society and ecosystems."

I am going to resist the temptation to batter you with statistics—there are some excellent detailed sources available online. Here instead are a few snapshots of the four-degree world.

1. **Heatwaves.** In the words of the World Bank, there would be a "new class of heatwaves of magnitudes never experienced before"—indeed, with temperatures not seen on Earth in the past five million years. Four degrees will be a global average, so temperatures over large land masses will rise far more than this, by six degrees over North Africa, the Middle East, and the contiguous United States. The warmest July in the Mediterranean region could be nine degrees Celsius warmer than today's warmest July.
2. **Extinctions.** Forty percent of plant and animal species will be at risk of extinction and the regional extinction of entire coral reef ecosystems would happen far earlier. Forests would be particularly vulnerable. A third of the Asian rainforests would be under threat and most of the Amazon would be at high risk of burning down.
3. **Food yields.** A three-degree rise causes all crops to experience a precipitous decline in their current growing regions. Overall yields could fall by a third in Africa. By some estimates temperature rises of over four degrees could reduce U.S. production of

corn, soybeans, and cotton by 63 to 82 percent. And there would be other pressures. In Africa and Australia 60 percent of current croplands would also be subject to extreme and recurrent droughts. These problems would be exacerbated by flooding, storms, and increased weed and pest invasions.

Other, equally catastrophic impacts follow close behind. Four degrees guarantees the total melting of the Greenland ice sheet and, most likely, the Western Antarctic ice sheet, raising sea levels by a combined thirty-two or more feet. The timescales are uncertain, but not the outcome: two thirds of the world's major cities and all of southern Bangladesh and Florida would end up underwater. Nor is there any guarantee that temperatures would level off at four degrees—at this level further powerful feedbacks and tipping points could lead temperatures to keep rising even further, to six and then eight degrees.

The research is developing and is still missing a strong sense of how these changes might interact with one another. What would be the combined effects of repeated droughts *and* storms *and* heatwaves *and* sea level rise? How would a world with nine billion people cope with such dramatic declines in the productivity of its main agricultural regions? What will happen to people in regions that are already marginal for human settlement when they become entirely uninhabitable?

Commenting on such interactions, Dr. Rachel Warren, a climate modeler at the Tyndall Centre for Climate Change Research, writes that "the limits for human and natural adaptation are likely to be exceeded." The World Bank echoes this when it concludes that there is "no certainty that adaptation might be possible." It is hard to comprehend what is meant by this abstract language, phrased, as so often, in the passive voice. Professor John Schellnhuber, one of the world's most influential climate scientists, is more direct: Speaking at a 2013 conference on the risks posed by a four-degree climate to Australia, he said that "the difference between two and four degrees is human civilization."

So when will we get there? Reviewing the current research, a British research team concluded that we could reach the four-degree point by the 2070s although, it noted, the 2060s are also possible.

However, the science around four degrees keeps moving—usually in the direction of greater pessimism. A recent paper from the University of New South Wales, Australia, argues that a decline of cloud cover in the

tropics will accelerate warming so much that global temperatures could reach four degrees by the midcentury and, potentially, eight degrees by the end of the century. So much for climate change being a problem for future generations.

These predictions are couched in caveats and uncertainties, but these are usually a matter of the timeline rather than the outcome. The key variable, on which they all agree, is the level of emissions (especially those from burning fossil fuels), and the speed with which we reduce them.

And so, once again, we return to the overarching influence that our psychological response—our acceptance, avoidance, or denial—has in determining which path we will take. The shifting language of climate science reflects the growing evidence that our collective decision to ignore climate change commits us to a pathway along which we are rapidly losing any future options for control or choice. And this is why the recognition, understanding, and resolution of the questions explored in this book are so critically important.

## References, Sources, and Further Reading

A FULL LIST OF LINE-BY-LINE references and sources is posted on the book website, [www.climateconviction.org](http://www.climateconviction.org). There is a lively and continuing discussion and the references are regularly updated with new comments and clarifications.

From more than seven hundred sources, I have chosen a short selection of those I have found most useful and stimulating. Those indicated with a \* can be found and downloaded on the Internet. I have shortened some of the titles for ease of searching.

### Overviews on the Psychology of Climate Change

Clive Hamilton has given years of thought to the issues I cover and his book, *Requiem for a Species* (2010, Routledge), was a major inspiration. His insights can also be found online in his 2009 paper with Tim Kasser, \*"Psychological Adaptation to the Threats and Stresses of a Four Degree World."

There are two major online summaries of climate change psychology. \**The Psychology of Climate Change Communication: A Guide* by Sabine Marx is a very nicely produced overview. A more technical summary is \**Psychology and Global Climate Change*, produced by an expert task force at the American Psychological Association.

Kari Norgaard's pioneering analysis of climate denial and silence in her book *Living in Denial* (2011, MIT Press) is very readable. She summarizes her ideas in an online report for the World Bank, \*"Cognitive and Behavioral Challenges in Responding to Climate Change."

Another innovative analysis of the underlying psychology of climate change—this time from the psychoanalytic tradition—comes in a selection