ESCAPING NATURE

How to Survive Global Climate Change

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PREFACE

The truth is that we have located our agriculture and built our communities and all associated infrastructure in places and to standards appropriate to what we thought was a relatively stable climate; climate conditions upon which we can no longer rely. What should be deeply alarming to all is that climate we have taken for granted for so long is, right before our very eyes, being replaced by a climate that, unless we act now, we may not survive.—Robert Sandford, Canadian water policy expert (quoted in Smith 2021)

Much has been published on the topic of global climate change, and we owe a debt of gratitude to these previous works. As we were writing this book in 2021–22, Nature taught us even more: wildfires in California, Oregon, Siberia, Europe, and China; heat waves in Europe, China, and North Africa; droughts in the southwestern United States, China, and Afghanistan; dwindling water levels in the Colorado, the Mississippi, the Yangtze, and the Rhine Rivers; major flooding in Yellowstone Park and Kentucky; Seoul, Korea; and Pakistan. Particularly memorable were:

- Death Valley (1.46 inches [3.7 cm] of rain, nearly a year's rainfall, in 3 hours!)
- Dallas (a summer's worth of rain in a day)
- Pakistan (millions displaced and much of the country covered by floodwaters)
- British Columbia (a deadly heat dome, followed by drought, wildfires, and floods)

All this plus a host of other climate-change-induced disasters are happening far sooner than scientists had anticipated.

Figure 1. Mary Edna Fraser, *Fossil Fuel Map*, 2022. Batik on silk, 48 × 55 in. (1.2 × 1.4 m). This map shows the areas around the world that potentially have the world's oil, gas, and coal deposits, based on data from the US Geological Survey, the European Commission, and other government sources. Purple and brown areas represent oil and gas, while red areas show possible coal deposits. Conservative in methodology, the map indicates the minimum bounds of fossil fuel on our planet. Developed by Alice McGown and the Leave It in the Ground Initiative, the art showcases the extent of carbon energy sources that must stay in the ground if humanity is to prevent catastrophic climate change. For more information, visit https://www.leave-it-in-the-ground.org. Image © Mary Edna Fraser.

ACKNOWLEDGMENTS

This book was a team effort involving family and friends from a variety of backgrounds and skills including legal, scientific, environmental, educational, artistic, and political. The glue holding such a diverse group together was recognition of the huge threat that climate change holds for humans. The statement by Robert Sandford in the preface is one that we find deeply compelling.

In writing this volume, we received a lot of enthusiastic help from friends and others offering stories and information. More often than not, they had experienced a significant climate change event or knew someone who had. It seemed that everyone was interested in this topic.

We particularly wish to thank Gisela Fosado, editorial director at Duke University Press, whose enthusiasm for the book right from the start was an inspiration. Thanks also to assistant editor Alejandra Mejia and Lisa Lawley, our ever-patient project editor, who helped us navigate the technical problems of producing a publishable manuscript, and to Laura Sell, who got the word out.

INTRODUCTION

Greenhouse gas emissions keep growing. Global temperatures keep rising. And our planet is fast approaching tipping points that will make climate chaos irreversible. We are on a highway to climate hell with our foot still on the accelerator.
—António Guterres, secretary-general of the United Nations

Humanity has entered a nasty, brutish Hobbesian world where rising seas will drown the world's coastal communities, parts of the Earth will become too hot for humans to live, and millions of climate refugees will pour into the United States, Canada, and Europe, straining food, water, and energy supplies as well as human compassion. Droughts, floods, wildfires, powerful hurricanes, heat waves, food shortages, ocean acidification, and military conflicts over dwindling resources are among a host of evils released from the Pandora's box of industrial capitalism. Climate change has arrived. And humans will not be the only ones harmed.

As a species we are molded by natural selection to react to immediate physical danger, to run from a charging mammoth, or if need be to nock an arrow for defense. We are not mentally equipped to prepare for a slow-moving abstraction like climate change that unfolds over decades and centuries. It is no surprise that our minds become numb from unrelenting news of climatic disasters, paralyzed into inaction like deer caught in the headlights of climate dread, our fears amplified by an age of divided politics where one side refuses to acknowledge the findings of science simply because the other side does. But there is some good news and perhaps room for guarded optimism.

The mainstream media are finally starting to talk openly about climate change, something that would have been unthinkable just a few years ago. Moreover, we humans are intelligent, creative, and resourceful. We *will* do something about climate change. Why? Because we've been handed what is known in chess as a forced move, where a player must do something to save

the king. Sooner or later the frequency and intensity of disasters triggered by a roasting planet will compel even the most hard-core, dyed-in-the-wool, obtuse climate change minimizer to admit that something is amiss, that a hitherto stable Nature has gone dangerously unhinged and we'd better do something about it or the game is lost. When that bright moment of clarity arrives, mammalian instincts to protect children at all costs will rise to the fore, overriding greed, political stalemate, and reluctance to change. Then at long last we'll roll up our collective sleeves and get to work.

And now we come to the crux of the matter. While we wait for society to reach that bright moment of clarity, what do we do in the interim? Anthropogenic climate change began with the rise of agriculture and animal husbandry before really taking off during the Industrial Revolution. We can't go back to a preindustrial state (nor would we want to). Our only options now for dealing with a warming world are to mitigate, adapt, or suffer. (See figure 2 for how these three options can sometimes overlap.)

Mitigation addresses the causes of climate change. It is a proactive attempt to remove carbon dioxide (CO_2) from the air either by using natural processes or through engineering. Examples of the former are planting trees, restoring ecosystems, and raising fewer children. Examples of the latter are developing carbon-free technologies and geoengineering.

Adaptation deals with the effects of climate change. It is a reactive approach that could be as simple as making a house fire resistant or as difficult as a family pulling up roots and moving to a region with no wildfires. In the case of coastal living, adaptation includes building seawalls, evacuating from hurricanes, or relocating entire cities inland.

Suffering is self-explanatory. We do little and so suffer much. For those with limited resources, the hardships of climate change will be hard indeed. Put simply, the poor will suffer the most. The rich will move to New Zealand.

The focus of this book is adaptation: what individuals, communities, and government can do to weather (no pun intended) the privations of an already deteriorating climate. If we are lucky, the apocalyptic events outlined above will unfold slowly over centuries instead of decades, giving us time to adjust. But the science suggests otherwise. The 2021 and 2022 reports of the Intergovernmental Panel on Climate Change (IPCC) conclude that the world's climate is changing faster than the models predicted and that the pace of change will accelerate in the near future. We are running out of time. While we wait for technological breakthroughs in climate mitigation and for the slow-turning wheels of bureaucratic governance to lumber toward some kind of clarity, we must fend for ourselves, must rethink how and where to live. To survive global change we must find ways to escape Nature.

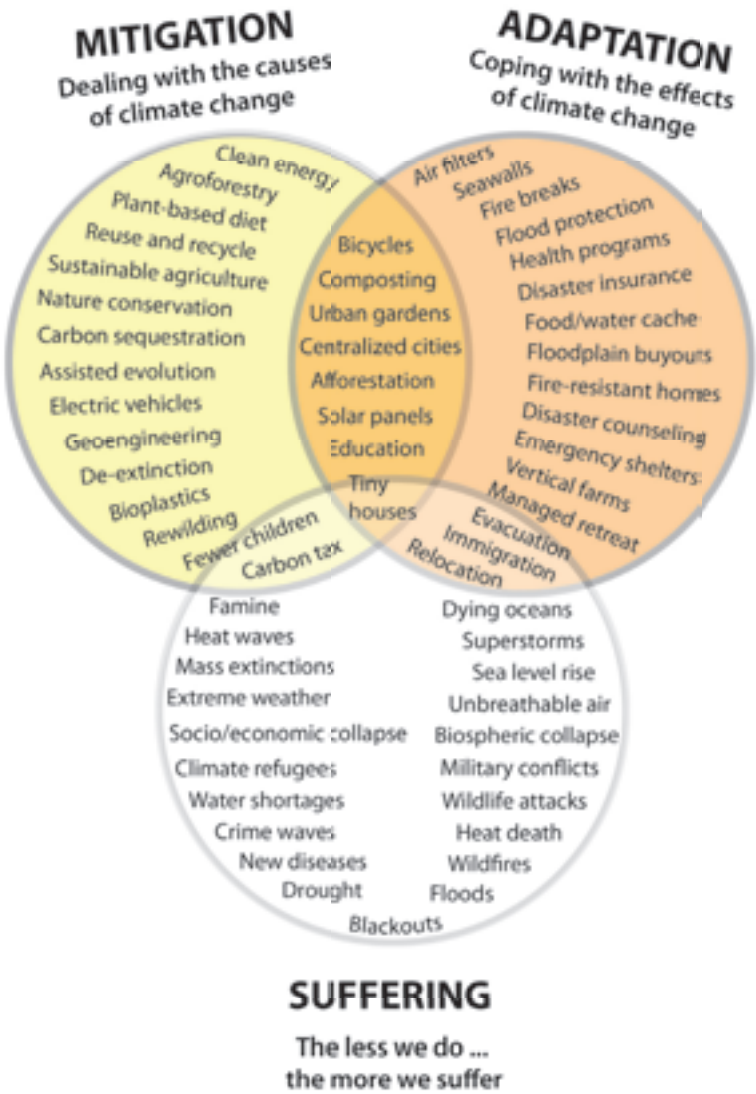

Figure 2. The diagram illustrates the overlap between climate change adaptation, mitigation, and suffering. Drawing by Charles Pilkey.

The book is divided into five parts corresponding to the five elements of classical times: earth, air, fire, water, and space. Within each part are several chapters, or topics of discussion, which include (1) a description of a particular climate-related threat and (2) a what-to-do summary of ways to neutralize or adapt to that threat.

"Earth" recaps the geologic history of climate change and its impact on biodiversity, summarizes the findings of the UN IPCC reports, explains the significance of melting permafrost, and closes with a grim forecast of widespread crop failures, hunger, and malnutrition. "Air" is about greenhouse gases, changing weather patterns, heat waves, stronger hurricanes, and deteriorating air quality. "Fire" describes the impact of wildfires on human society and on the planet's ecosystems. Rising seas, dying oceans, floods, droughts, and declining water quality are some of the many cheerful topics covered in "Water."

The last part, "Space," talks about the migration of climate refugees (both human and nonhuman), health issues related to climate change, and how cities can adapt to a fast-changing planet. Its final chapter, "The Biosphere," concludes with an argument for the rights of Nature and a cogent reminder that we must maintain a healthy biosphere so that when we depart this world to colonize others, we will have a viable home planet to return to.

For those in a hurry, the book's main points are summarized in "The Heart of the Matter." "New Ideas" explores some of the more intriguing proposals for dealing with climate change. Because so many important climate-related events happened during the production of this book, we felt obliged to list them in "New Developments." "Bug-Out Bags" provides an inventory of essential items people should take when fleeing extreme weather events, followed by "To Learn More," a list of resources for those seeking a deeper understanding of climate science and biodiversity issues.

The way to climate stability will be hard. It will take all our ingenuity and determination. And then it will ask for more . . . and more. We, the children of the affluent West (and the affluent East), have been tasked with the near-impossible assignment of redesigning social, economic, technological, and even spiritual systems, sacrificing along the way our comfortable fossil fuel–based lifestyles so that future generations, people we will never meet or know, can lead happier lives free from the horrors of climate chaos. Some may be tempted to believe otherwise, but the strategies for adapting to climate change like those presented in this book are at best temporary measures, necessary tactics to buy time for policy makers to implement more permanent solutions. Adaptation is the beginning, but without mitigation it will not be enough. Either we curb our carbon emissions, or we suffer the consequences of societal and biospheric collapse.

Documentary Films

An Inconvenient Truth (2006), directed by Davis Guggenheim. Al Gore's efforts to raise awareness about global warming.

An Inconvenient Sequel: Truth to Power (2017), directed by Bonnie Cohen and Jon Shenk. The follow-up to *An Inconvenient Truth* one decade on.

Before the Flood (2016), directed by Fisher Stevens for National Geographic. Narrated by Leonardo DiCaprio, who travels the world to see the effects of climate change.

Chasing Ice (2012), directed by Jeff Orlowski. Beautiful time-lapse photography of retreating glaciers showing the impact of climate change on the planet's ice.

Cowspiracy: The Sustainability Secret (2014), directed by Kip Anderson and Keegan Kuhn. The connections between cows and methane emissions.

Ice on Fire (2019), directed by Leila Conners. Narrated by Leonardo DiCaprio. Cites the evidence that climate change is happening now and explores ways to resolve the climate crisis.

Kiss the Ground (2013), directed by Josh and Rebecca Tickell. Narrated by Woody Harrelson. How regenerative farming, low tillage, ground cover, and other techniques can replenish vanishing topsoil, sequester carbon, and reduce global warming.

Television

Apple TV's *Extrapolations*. An intellectually dense drama about future climate change coupled with developments in AI.

EarthxTV. A network dedicated to promoting environmental sustainability. Excellent series on climate change adaptations, sea level rise, and green cities.

Link TV. Environmental issues discussed on *Bioneers*, *Earth Focus*, and other episodes.

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