The Great Derangement

CLIMATE CHANGE AND THE UNTHINKABLE

Amitav Ghosh

THE GREAT DERANGEMENT

The Randy L. and Melvin R. Berlin Family Lectures

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FOR MUKUL KESAVAN

In memory of the 1978 tornado

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PART I

Stories

1.

Who can forget those moments when something that seems inanimate turns out to be vitally, even dangerously alive? As, for example, when an arabesque in the pattern of a carpet is revealed to be a dog's tail, which, if stepped upon, could lead to a nipped ankle? Or when we reach for an innocent looking vine and find it to be a worm or a snake? When a harmlessly drifting log turns out to be a crocodile?

It was a shock of this kind, I imagine, that the makers of *The Empire Strikes Back* had in mind when they conceived of the scene in which Han Solo lands the Millennium Falcon on what he takes to be an asteroid—but only to discover that he has entered the gullet of a sleeping space monster.

To recall that memorable scene now, more than thirty-five years after the making of the film, is to recognize its impossibility. For if ever there were a Han Solo, in the near or distant future, his assumptions about interplanetary objects are certain to be very different from those that prevailed in California at the time when the film was made. The humans of the future will surely understand, knowing what they presumably will know about the history of their forebears on Earth, that only in one, very brief era, lasting less than three centuries, did a significant number of their kind believe that planets and asteroids are inert.

2.

My ancestors were ecological refugees long before the term was invented.

They were from what is now Bangladesh, and their village was on the shore of the Padma River, one of the mightiest wa-

terways in the land. The story, as my father told it, was this: one day in the mid-1850s the great river suddenly changed course, drowning the village; only a few of the inhabitants had managed to escape to higher ground. It was this catastrophe that had unmoored our forebears; in its wake they began to move westward and did not stop until the year 1856, when they settled once again on the banks of a river, the Ganges, in Bihar.

I first heard this story on a nostalgic family trip, as we were journeying down the Padma River in a steamboat. I was a child then, and as I looked into those swirling waters I imagined a great storm, with coconut palms bending over backward until their fronds lashed the ground; I envisioned women and children racing through howling winds as the waters rose behind them. I thought of my ancestors sitting huddled on an outcrop, looking on as their dwellings were washed away.

To this day, when I think of the circumstances that have shaped my life, I remember the elemental force that untethered my ancestors from their homeland and launched them on the series of journeys that preceded, and made possible, my own travels. When I look into my past the river seems to meet my eyes, staring back, as if to ask, Do you recognize me, wherever you are?

Recognition is famously a passage from ignorance to knowledge. To recognize, then, is not the same as an initial introduction. Nor does recognition require an exchange of words: more often than not we recognize mutely. And to recognize is by no means to understand that which meets the eye; comprehension need play no part in a moment of recognition.

The most important element of the word *recognition* thus lies in its first syllable, which harks back to something prior, an already existing awareness that makes possible the passage from ignorance to knowledge: a moment of recognition occurs when a prior awareness flashes before us, effecting an instant

change in our understanding of that which is beheld. Yet this flash cannot appear spontaneously; it cannot disclose itself except in the presence of its lost other. The knowledge that results from recognition, then, is not of the same kind as the discovery of something new: it arises rather from a renewed reckoning with a potentiality that lies within oneself.

This, I imagine, was what my forebears experienced on that day when the river rose up to claim their village: they awoke to the recognition of a presence that had molded their lives to the point where they had come to take it as much for granted as the air they breathed. But, of course, the air too can come to life with sudden and deadly violence—as it did in the Congo in 1988, when a great cloud of carbon dioxide burst forth from Lake Nyos and rolled into the surrounding villages, killing 1,700 people and an untold number of animals. But more often it does so with a quiet insistence—as the inhabitants of New Delhi and Beijing know all too well—when inflamed lungs and sinuses prove once again that there is no difference between the without and the within; between using and being used. These too are moments of recognition, in which it dawns on us that the energy that surrounds us, flowing under our feet and through wires in our walls, animating our vehicles and illuminating our rooms, is an all-encompassing presence that may have its own purposes about which we know nothing.

It was in this way that I too became aware of the urgent proximity of nonhuman presences, through instances of recognition that were forced upon me by my surroundings. I happened then to be writing about the Sundarbans, the great mangrove forest of the Bengal Delta, where the flow of water and silt is such that geological processes that usually unfold in deep time appear to occur at a speed where they can be followed from week to week and month to month. Overnight a stretch of riverbank will disappear, sometimes taking houses

and people with it; but elsewhere a shallow mud bank will arise and within weeks the shore will have broadened by several feet. For the most part, these processes are of course cyclical. But even back then, in the first years of the twenty-first century, portents of accumulative and irreversible change could also be seen, in receding shorelines and a steady intrusion of salt water on lands that had previously been cultivated.

This is a landscape so dynamic that its very changeability leads to innumerable moments of recognition. I captured some of these in my notes from that time, as, for example, in these lines, written in May 2002: "I do believe it to be true that the land here is demonstrably alive; that it does not exist solely, or even incidentally, as a stage for the enactment of human history; that it is [itself] a protagonist." Elsewhere, in another note, I wrote, "Here even a child will begin a story about his grandmother with the words: 'in those days the river wasn't here and the village was not where it is . . .'"

Yet, I would not be able to speak of these encounters as instances of recognition if some prior awareness of what I was witnessing had not already been implanted in me, perhaps by childhood experiences, like that of going to look for my family's ancestral village; or by memories like that of a cyclone, in Dhaka, when a small fishpond, behind our walls, suddenly turned into a lake and came rushing into our house; or by my grandmother's stories of growing up beside a mighty river; or simply by the insistence with which the landscape of Bengal forces itself on the artists, writers, and filmmakers of the region.

But when it came to translating these perceptions into the medium of my imaginative life—into fiction, that is—I found myself confronting challenges of a wholly different order from those that I had dealt with in my earlier work. Back then, those challenges seemed to be particular to the book I was then writing, *The Hungry Tide*; but now, many years later,

at a moment when the accelerating impacts of global warming have begun to threaten the very existence of low-lying areas like the Sundarbans, it seems to me that those problems have far wider implications. I have come to recognize that the challenges that climate change poses for the contemporary writer, although specific in some respects, are also products of something broader and older; that they derive ultimately from the grid of literary forms and conventions that came to shape the narrative imagination in precisely that period when the accumulation of carbon in the atmosphere was rewriting the destiny of the earth.

3.

That climate change casts a much smaller shadow within the landscape of literary fiction than it does even in the public arena is not hard to establish. To see that this is so, we need only glance through the pages of a few highly regarded literary journals and book reviews, for example, the *London Review of Books*, the *New York Review of Books*, the *Los Angeles Review of Books*, the *Literary Journal*, and the *New York Times Review of Books*. When the subject of climate change occurs in these publications, it is almost always in relation to nonfiction; novels and short stories are very rarely to be glimpsed within this horizon. Indeed, it could even be said that fiction that deals with climate change is almost by definition not of the kind that is taken seriously by serious literary journals: the mere mention of the subject is often enough to relegate a novel or a short story to the genre of science fiction. It is as though in the literary imagination climate change were somehow akin to extraterrestrials or interplanetary travel.

There is something confounding about this peculiar feedback loop. It is very difficult, surely, to imagine a conception of

seriousness that is blind to potentially life-changing threats. And if the urgency of a subject were indeed a criterion of its seriousness, then, considering what climate change actually portends for the future of the earth, it should surely follow that this would be the principal preoccupation of writers the world over—and this, I think, is very far from being the case.

But why? Are the currents of global warming too wild to be navigated in the accustomed barques of narration? But the truth, as is now widely acknowledged, is that we have entered a time when the wild has become the norm: if certain literary forms are unable to negotiate these torrents, then they will have failed—and their failures will have to be counted as an aspect of the broader imaginative and cultural failure that lies at the heart of the climate crisis.

Clearly the problem does not arise out of a lack of information: there are surely very few writers today who are oblivious to the current disturbances in climate systems the world over. Yet, it is a striking fact that when novelists do choose to write about climate change it is almost always outside of fiction. A case in point is the work of Arundhati Roy: not only is she one of the finest prose stylists of our time, she is passionate and deeply informed about climate change. Yet all her writings on these subjects are in various forms of nonfiction.

Or consider the even more striking case of Paul Kingsnorth, author of *The Wake*, a much-admired historical novel set in eleventh-century England. Kingsnorth dedicated several years of his life to climate change activism before founding the influential Dark Mountain Project, "a network of writers, artists and thinkers who have stopped believing the stories our civilization tells itself." Although Kingsnorth has written a powerful nonfiction account of global resistance movements, as of the time of writing he has yet to publish a novel in which climate change plays a major part.

I too have been preoccupied with climate change for a long time, but it is true of my own work as well, that this subject figures only obliquely in my fiction. In thinking about the mismatch between my personal concerns and the content of my published work, I have come to be convinced that the discrepancy is not the result of personal predilections: it arises out of the peculiar forms of resistance that climate change presents to what is now regarded as serious fiction.

4.

In his seminal essay "The Climate of History," Dipesh Chakrabarty observes that historians will have to revise many of their fundamental assumptions and procedures in this era of the Anthropocene, in which "humans have become geological agents, changing the most basic physical processes of the earth." I would go further and add that the Anthropocene presents a challenge not only to the arts and humanities, but also to our commonsense understandings and beyond that to contemporary culture in general.

There can be no doubt, of course, that this challenge arises in part from the complexities of the technical language that serves as our primary window on climate change. But neither can there be any doubt that the challenge derives also from the practices and assumptions that guide the arts and humanities. To identify how this happens is, I think, a task of the utmost urgency: it may well be the key to understanding why contemporary culture finds it so hard to deal with climate change. Indeed, this is perhaps the most important question ever to confront *culture* in the broadest sense—for let us make no mistake: the climate crisis is also a crisis of culture, and thus of the imagination.

Culture generates desires—for vehicles and appliances, for

certain kinds of gardens and dwellings—that are among the principal drivers of the carbon economy. A speedy convertible excites us neither because of any love for metal and chrome, nor because of an abstract understanding of its engineering. It excites us because it evokes an image of a road arrowing through a pristine landscape; we think of freedom and the wind in our hair; we envision James Dean and Peter Fonda racing toward the horizon; we think also of Jack Kerouac and Vladimir Nabokov. When we see an advertisement that links a picture of a tropical island to the word *paradise*, the longings that are kindled in us have a chain of transmission that stretches back to Daniel Defoe and Jean-Jacques Rousseau: the flight that will transport us to the island is merely an ember in that fire. When we see a green lawn that has been watered with desalinated water, in Abu Dhabi or Southern California or some other environment where people had once been content to spend their water thriftily in nurturing a single vine or shrub, we are looking at an expression of a yearning that may have been midwifed by the novels of Jane Austen. The artifacts and commodities that are conjured up by these desires are, in a sense, at once expressions and concealments of the cultural matrix that brought them into being.

This culture is, of course, intimately linked with the wider histories of imperialism and capitalism that have shaped the world. But to know this is still to know very little about the specific ways in which the matrix interacts with different modes of cultural activity: poetry, art, architecture, theater, prose fiction, and so on. Throughout history these branches of culture have responded to war, ecological calamity, and crises of many sorts: why, then, should climate change prove so peculiarly resistant to their practices?

From this perspective, the questions that confront writers and artists today are not just those of the politics of the carbon

economy; many of them have to do also with our own practices and the ways in which they make us complicit in the concealments of the broader culture. For instance: if contemporary trends in architecture, even in this period of accelerating carbon emissions, favor shiny, glass-and-metal-plated towers, do we not have to ask, What are the patterns of desire that are fed by these gestures? If I, as a novelist, choose to use brand names as elements in the depiction of character, do I not need to ask myself about the degree to which this makes me complicit in the manipulations of the marketplace?

In the same spirit, I think it also needs to be asked, What is it about climate change that the mention of it should lead to banishment from the preserves of serious fiction? And what does this tell us about culture writ large and its patterns of evasion?

In a substantially altered world, when sea-level rise has swallowed the Sundarbans and made cities like Kolkata, New York, and Bangkok uninhabitable, when readers and museum-goers turn to the art and literature of our time, will they not look, first and most urgently, for traces and portents of the altered world of their inheritance? And when they fail to find them, what should they—what can they—do other than to conclude that ours was a time when most forms of art and literature were drawn into the modes of concealment that prevented people from recognizing the realities of their plight? Quite possibly, then, this era, which so congratulates itself on its self-awareness, will come to be known as the time of the Great Derangement.

5.

On the afternoon of March 17, 1978, the weather took an odd turn in north Delhi. Mid-march is usually a nice time of year

in that part of India: the chill of winter is gone and the blazing heat of summer is yet to come; the sky is clear and the monsoon is far away. But that day dark clouds appeared suddenly and there were squalls of rain. Then followed an even bigger surprise: a hailstorm.

I was then studying for an MA at Delhi University while also working as a part-time journalist. When the hailstorm broke, I was in a library. I had planned to stay late, but the unseasonal weather led to a change of mind and I decided to leave. I was on my way back to my room when, on an impulse, I changed direction and dropped in on a friend. But the weather continued to worsen as we were chatting, so after a few minutes I decided to head straight back by a route that I rarely had occasion to take.

I had just passed a busy intersection called Maurice Nagar when I heard a rumbling sound somewhere above. Glancing over my shoulder I saw a gray, tube-like extrusion forming on the underside of a dark cloud: it grew rapidly as I watched, and then all of a sudden it turned and came whiplashing down to earth, heading in my direction.

Across the street lay a large administrative building. I sprinted over and headed toward what seemed to be an entrance. But the glass-fronted doors were shut, and a small crowd stood huddled outside, in the shelter of an overhang. There was no room for me there so I ran around to the front of the building. Spotting a small balcony, I jumped over the parapet and crouched on the floor.

The noise quickly rose to a frenzied pitch, and the wind began to tug fiercely at my clothes. Stealing a glance over the parapet, I saw, to my astonishment, that my surroundings had been darkened by a churning cloud of dust. In the dim glow that was shining down from above, I saw an extraordinary panoply of objects flying past—bicycles, scooters, lampposts,

sheets of corrugated iron, even entire tea stalls. In that instant, gravity itself seemed to have been transformed into a wheel spinning upon the fingertip of some unknown power.

I buried my head in my arms and lay still. Moments later the noise died down and was replaced by an eerie silence. When at last I climbed out of the balcony, I was confronted by a scene of devastation such as I had never before beheld. Buses lay overturned, scooters sat perched on treetops, walls had been ripped out of buildings, exposing interiors in which ceiling fans had been twisted into tulip-like spirals. The place where I had first thought to take shelter, the glass-fronted doorway, had been reduced to a jumble of jagged debris. The panes had shattered, and many people had been wounded by the shards. I realized that I too would have been among the injured had I remained there. I walked away in a daze.

Long afterward, I am not sure exactly when or where, I hunted down the *Times of India*'s New Delhi edition of March 18. I still have the photocopies I made of it.

"30 Dead," says the banner headline, "700 Hurt As Cyclone Hits North Delhi."

Here are some excerpts from the accompanying report: "Delhi, March 17: At least 30 people were killed and 700 injured, many of them seriously, this evening when a freak funnel-shaped whirlwind, accompanied by rain, left in its wake death and devastation in Maurice Nagar, a part of Kingsway Camp, Roshanara Road and Kamla Nagar in the Capital. The injured were admitted to different hospitals in the Capital.

"The whirlwind followed almost a straight line. . . . Some eyewitnesses said the wind hit the Yamuna river and raised waves as high as 20 or 30 feet. . . . The Maurice Nagar road . . . presented a stark sight. It was littered with fallen poles . . . trees, branches, wires, bricks from the boundary walls of various institutions, tin roofs of staff quarters and dhabas and scores of

scooters, buses and some cars. Not a tree was left standing on either side of the road."

The report quotes a witness: "I saw my own scooter, which I had abandoned on the road, during those terrifying moments, being carried away in the wind like a kite. We saw all this happening around but were dumbfounded. We saw people dying . . . but were unable to help them. The two tea-stalls at the Maurice Nagar corner were blown out of existence. At least 12 to 15 persons must have been buried under the debris at this spot. When the hellish fury had abated in just four minutes, we saw death and devastation around."

The vocabulary of the report is evidence of how unprecedented this disaster was. So unfamiliar was this phenomenon that the papers literally did not know what to call it: at a loss for words they resorted to "cyclone" and "funnel-shaped whirlwind."

Not till the next day was the right word found. The headlines of March 19 read, "A Very, Very Rare Phenomenon, Says Met Office": "It was a tornado that hit northern parts of the Capital yesterday—the first of its kind. . . . According to the Indian Meteorological Department, the tornado was about 50 metres wide and covered a distance of about five k.m. in the space of two or three minutes."

This was, in effect, the first tornado to hit Delhi—and indeed the entire region—in recorded meteorological history. And somehow I, who almost never took that road, who rarely visited that part of the university, had found myself in its path.

Only much later did I realize that the tornado's eye had passed directly over me. It seemed to me that there was something eerily apt about that metaphor: what had happened at that moment was strangely like a species of visual contact, of beholding and being beheld. And in that instant of contact something was planted deep in my mind, something irreduc-

ibly mysterious, something quite apart from the danger that I had been in and the destruction that I had witnessed; something that was not a property of the thing itself but of the manner in which it had intersected with my life.

6.

As is often the case with people who are waylaid by unpredictable events, for years afterward my mind kept returning to my encounter with the tornado. Why had I walked down a road that I almost never took, just before it was struck by a phenomenon that was without historical precedent? To think of it in terms of chance and coincidence seemed only to impoverish the experience: it was like trying to understand a poem by counting the words. I found myself reaching instead for the opposite end of the spectrum of meaning—for the extraordinary, the inexplicable, the confounding. Yet these too did not do justice to my memory of the event.

Novelists inevitably mine their own experience when they write. Unusual events being necessarily limited in number, it is but natural that these should be excavated over and again, in the hope of discovering a yet undiscovered vein.

No less than any other writer have I dug into my own past while writing fiction. By rights then, my encounter with the tornado should have been a mother lode, a gift to be mined to the last little nugget.

It is certainly true that storms, floods, and unusual weather events do recur in my books, and this may well be a legacy of the tornado. Yet oddly enough, no tornado has ever figured in my novels. Nor is this due to any lack of effort on my part. Indeed, the reason I still possess those cuttings from the *Times of India* is that I have returned to them often over the years,

hoping to put them to use in a novel, but only to meet with failure at every attempt.

On the face of it there is no reason why such an event should be difficult to translate into fiction; after all, many novels are filled with strange happenings. Why then did I fail, despite my best efforts, to send a character down a road that is imminently to be struck by a tornado?

In reflecting on this, I find myself asking, What would I make of such a scene were I to come across it in a novel written by someone else? I suspect that my response would be one of incredulity; I would be inclined to think that the scene was a contrivance of last resort. Surely only a writer whose imaginative resources were utterly depleted would fall back on a situation of such extreme improbability?

Improbability is the key word here, so we have to ask, What does the word mean?

Improbable is not the opposite of *probable*, but rather an inflexion of it, a gradient in a continuum of probability. But what does probability—a mathematical idea—have to do with fiction?

The answer is: Everything. For, as Ian Hacking, a prominent historian of the concept, puts it, probability is a "manner of conceiving the world constituted without our being aware of it."

Probability and the modern novel are in fact twins, born at about the same time, among the same people, under a shared star that destined them to work as vessels for the containment of the same kind of experience. Before the birth of the modern novel, wherever stories were told, fiction delighted in the unheard-of and the unlikely. Narratives like those of *The Arabian Nights, The Journey to the West*, and *The Decameron* proceed by leaping blithely from one exceptional event to another. This, after all, is how storytelling must necessarily proceed,

inasmuch as it is a recounting of "what happened"—for such an inquiry can arise only in relation to something out of the ordinary, which is but another way of saying "exceptional" or "unlikely." In essence, narrative proceeds by linking together moments and scenes that are in some way distinctive or different: these are, of course, nothing other than instances of exception.

Novels too proceed in this fashion, but what is distinctive about the form is precisely the concealment of those exceptional moments that serve as the motor of narrative. This is achieved through the insertion of what Franco Moretti, the literary theorist, calls "fillers." According to Moretti, "fillers function very much like the good manners so important in [Jane] Austen: they are both mechanisms designed to keep the 'narrativity' of life under control—to give a regularity, a 'style' to existence." It is through this mechanism that worlds are conjured up, through everyday details, which function "as *the opposite of narrative*."

It is thus that the novel takes its modern form, through "the relocation of the unheard-of toward the background . . . while the everyday moves into the foreground."

Thus was the novel midwifed into existence around the world, through the banishing of the improbable and the insertion of the everyday. The process can be observed with exceptional clarity in the work of Bankim Chandra Chatterjee, a nineteenth-century Bengali writer and critic who self-consciously adopted the project of carving out a space in which realist European-style fiction could be written in the vernacular languages of India. Chatterjee's enterprise, undertaken in a context that was far removed from the metropolitan mainstream, is one of those instances in which a circumstance of exception reveals the true life of a regime of thought and practice.

Chatterjee was, in effect, seeking to supersede many old and very powerful forms of fiction, ranging from the ancient Indian epics to Buddhist Jataka stories and the immensely fecund Islamicate tradition of Urdu *dastaans*. Over time, these narrative forms had accumulated great weight and authority, extending far beyond the Indian subcontinent: his attempt to claim territory for a new kind of fiction was thus, in its own way, a heroic endeavor. That is why Chatterjee's explorations are of particular interest: his charting of this new territory puts the contrasts between the Western novel and other, older forms of narrative in ever-sharper relief.

In a long essay on Bengali literature, written in 1871, Chatterjee launched a frontal assault on writers who modeled their work on traditional forms of storytelling: his attack on this so-called Sanskrit school was focused precisely on the notion of "mere narrative." What he advocated instead was a style of writing that would accord primacy to "sketches of character and pictures of Bengali life."

What this meant, in practice, is very well illustrated by Chatterjee's first novel, *Rajmohan's Wife*, which was written in English in the early 1860s. Here is a passage: "The house of Mathur Ghose was a genuine specimen of mofussil [provincial] magnificence united with a mofussil want of cleanliness. . . . From the far-off paddy fields you could descry through the intervening foliage, its high palisades and blackened walls. On a nearer view might be seen pieces of plaster of a venerable antiquity prepared to bid farewell to their old and weather-beaten tenement."

Compare this with the following lines from Gustave Flaubert's *Madame Bovary*: "We leave the high road . . . whence the valley is seen. . . . The meadow stretches under a bulge of low hills to join at the back with the pasture land of the Bray country, while on the eastern side, the plain, gently rising, broad-

ens out, showing as far as eye can follow its blond cornfields."

In both these passages, the reader is led into a "scene" through the eye and what it beholds: we are invited to "descry," to "view," to "see." In relation to other forms of narrative, this is indeed something new: instead of being told about what happened we learn about what was observed. Chatterjee has, in a sense, gone straight to the heart of the realist novel's "mimetic ambition": detailed descriptions of everyday life (or "fillers") are therefore central to his experiment with this new form.

Why should the rhetoric of the everyday appear at exactly the time when a regime of statistics, ruled by ideas of probability and improbability, was beginning to give new shapes to society? Why did fillers suddenly become so important? Moretti's answer is "'Because they *offer the kind of narrative pleasure compatible with the new regularity of bourgeois life*. Fillers turn the novel into a 'calm passion' . . . they are part of what Weber called the 'rationalization' of modern life: a process that begins in the economy and in the administration, but eventually pervades the sphere of free time, private life, entertainment, feelings. . . . Or in other words: fillers are an attempt at rationalizing the novelistic universe: turning it into a world of few surprises, fewer adventures, and no miracles at all."

This regime of thought imposed itself not only on the arts but also on the sciences. That is why *Time's Arrow, Time's Cycle*, Stephen Jay Gould's brilliant study of the geological theories of gradualism and catastrophism is, in essence, a study of narrative. In Gould's telling of the story, the catastrophist recounting of the earth's history is exemplified by Thomas Burnet's *Sacred Theory of the Earth* (1690) in which the narrative turns on events of "unrepeatable uniqueness." As opposed to this, the gradualist approach, championed by James Hutton (1726–97) and Charles Lyell (1797–1875), privileges slow processes that unfold over time at even, predictable rates. The central credo

in this doctrine was "nothing could change otherwise than the way things were seen to change in the present." Or, to put it simply: "Nature does not make leaps."

The trouble, however, is that Nature does certainly jump, if not leap. The geological record bears witness to many fractures in time, some of which led to mass extinctions and the like: it was one such, in the form of the Chicxulub asteroid, that probably killed the dinosaurs. It is indisputable, in any event, that catastrophes waylay both the earth and its individual inhabitants at unpredictable intervals and in the most improbable ways.

Which, then, has primacy in the real world, predictable processes or unlikely events? Gould's response is "the only possible answer can be 'both and neither.'" Or, as the National Research Council of the United States puts it: "It is not known whether the relocation of materials on the surface of the Earth is dominated by the slower but continuous fluxes operating all the time or by the spectacular large fluxes that operate during short-lived cataclysmic events."

It was not until quite recently that geology reached this agnostic consensus. Through much of the era when geology—and also the modern novel—were coming of age, the gradualist (or "uniformitarian") view held absolute sway and catastrophism was exiled to the margins. Gradualists consolidated their victory by using one of modernity's most effective weapons: its insistence that it has rendered other forms of knowledge obsolete. So, as Gould so beautifully demonstrates, Lyell triumphed over his adversaries by accusing them of being primitive: "In an early stage of advancement, when a great number of natural appearances are unintelligible, an eclipse, an earthquake, a flood, or the approach of a comet, with many other occurrences afterwards found to belong to the regular course of events, are regarded as prodigies. The same delusion prevails as to moral phenomena, and many of these are ascribed to the

intervention of demons, ghosts, witches, and other immaterial and supernatural agents."

This is exactly the rhetoric that Chatterjee uses in attacking the "Sanskrit school": he accuses those writers of depending on conventional modes of expression and fantastical forms of causality. "If love is to be the theme, Madana is invariably put into requisition with his five flower-tipped arrows; and the tyrannical king of Spring never fails to come to fight in his cause, with his army of bees, and soft breezes, and other ancient accompaniments. Are the pangs of separation to be sung? The moon is immediately cursed and anathematized, as scorching the poor victim with her cold beams."

Flaubert sounds a strikingly similar note in satirizing the narrative style that entrances the young Emma Rouault: in the novels that were smuggled into her convent, it was "all love, lovers, sweethearts, persecuted ladies fainting in lonely pavilions, postilions killed at every stage, horses ridden to death on every page, sombre forests, heartaches, vows, sobs, tears and kisses, little skiffs by moonlight, nightingales in shady groves." All of this is utterly foreign to the orderly bourgeois world that Emma Bovary is consigned to; such fantastical stuff belongs in the "dithyrambic lands" that she longs to inhabit.

In a striking summation of her tastes in narrative, Emma declares, "I . . . adore stories that rush breathlessly along, that frighten one. I detest commonplace heroes and moderate sentiments, such as there are in Nature."

"Commonplace"? "Moderate"? How did Nature ever come to be associated with words like these?

The incredulity that these associations evoke today is a sign of the degree to which the Anthropocene has already disrupted many assumptions that were founded on the relative climatic stability of the Holocene. From the reversed perspective of our time, the complacency and confidence of the emergent

bourgeois order appears as yet another of those uncanny instances in which the planet seems to have been toying with humanity, by allowing it to assume that it was free to shape its own destiny.

Unlikely though it may seem today, the nineteenth century was indeed a time when it was assumed, in both fiction and geology, that Nature was moderate and orderly: this was a distinctive mark of a new and "modern" worldview. Chatterjee goes out of his way to berate his contemporary, the poet Michael Madhusudan Datta, for his immoderate portrayals of Nature: "Mr. Datta . . . wants repose. The winds rage their loudest when there is no necessity for the lightest puff. Clouds gather and pour down a deluge, when they need do nothing of the kind; and the sea grows terrible in its wrath, when everybody feels inclined to resent its interference."

The victory of gradualist views in science was similarly won by characterizing catastrophism as un-modern. In geology, the triumph of gradualist thinking was so complete that Alfred Wegener's theory of continental drift, which posited upheavals of sudden and unimaginable violence, was for decades discounted and derided.

It is worth recalling that these habits of mind held sway until late in the twentieth century, especially among the general public. "As of the mid-1960s," writes the historian John L. Brooke, "a gradualist model of earth history and evolution . . . reigned supreme." Even as late as 1985, the editorial page of the *New York Times* was inveighing against the asteroidal theory of dinosaur extinction: "Astronomers should leave to astrologers the task of seeking the causes of events in the stars." As for professional paleontologists, Elizabeth Kolbert notes, they reviled both the theory and its originators, Luis and Walter Alvarez: "'The Cretaceous extinctions were gradual and the catastrophe theory is wrong,' . . . [a] paleontologist stated. But 'simplistic

theories will continue to come along to seduce a few scientists and enliven the covers of popular magazines.'"

In other words, gradualism became "a set of blinders" that eventually had to be put aside in favor of a view that recognizes the "twin requirements of uniqueness to mark moments of time as distinctive, and lawfulness to establish a basis of intelligibility."

Distinctive moments are no less important to modern novels than they are to any other forms of narrative, whether geological or historical. Ironically, this is nowhere more apparent than in *Rajmohan's Wife* and *Madame Bovary*, in both of which chance and happenstance are crucial to the narrative. In Flaubert's novel, for instance, the narrative pivots at a moment when Monsieur Bovary has an accidental encounter with his wife's soon-to-be lover at the opera, just after an impassioned scene during which she has imagined that the lead singer "was looking at her . . . She longed to run to his arms, to take refuge in his strength, as in the incarnation of love itself, and to say to him, to cry out, 'Take me away! carry me with you!'"

It could not, of course, be otherwise: if novels were not built upon a scaffolding of exceptional moments, writers would be faced with the Borgesian task of reproducing the world in its entirety. But the modern novel, unlike geology, has never been forced to confront the centrality of the improbable: the concealment of its scaffolding of events continues to be essential to its functioning. It is this that makes a certain kind of narrative a recognizably modern novel.

Here, then, is the irony of the "realist" novel: the very gestures with which it conjures up reality are actually a concealment of the real.

What this means in practice is that the calculus of probability that is deployed within the imaginary world of a novel is not the same as that which obtains outside it; this is why it

is commonly said, "If this were in a novel, no one would believe it." Within the pages of a novel an event that is only slightly improbable in real life—say, an unexpected encounter with a long-lost childhood friend—may seem wildly unlikely: the writer will have to work hard to make it appear persuasive.

If that is true of a small fluke of chance, consider how much harder a writer would have to work to set up a scene that is wildly improbable even in real life? For example, a scene in which a character is walking down a road at the precise moment when it is hit by an unheard-of weather phenomenon?

To introduce such happenings into a novel is in fact to court eviction from the mansion in which serious fiction has long been in residence; it is to risk banishment to the humbler dwellings that surround the manor house—those generic outhouses that were once known by names such as "the Gothic," "the romance," or "the melodrama," and have now come to be called "fantasy," "horror," and "science fiction."

7.

So far as I know, climate change was not a factor in the tornado that struck Delhi in 1978. The only thing it has in common with the freakish weather events of today is its extreme improbability. And it appears that we are now in an era that will be defined precisely by events that appear, by our current standards of normalcy, highly improbable: flash floods, hundred-year storms, persistent droughts, spells of unprecedented heat, sudden landslides, raging torrents pouring down from breached glacial lakes, and, yes, freakish tornadoes.

The superstorm that struck New York in 2012, Hurricane Sandy, was one such highly improbable phenomenon: the word *unprecedented* has perhaps never figured so often in the description of a weather event. In his fine study of Hurricane San-

dy, the meteorologist Adam Sobel notes that the track of the storm, as it crashed into the east coast of the United States, was without precedent: never before had a hurricane veered sharply westward in the mid-Atlantic. In turning, it also merged with a winter storm, thereby becoming a "mammoth hybrid" and attaining a size unprecedented in scientific memory. The storm surge that it unleashed reached a height that exceeded any in the region's recorded meteorological history.

Indeed, Sandy was an event of such a high degree of improbability that it confounded statistical weather-prediction models. Yet dynamic models, based on the laws of physics, were able to accurately predict its trajectory as well as its impacts.

But calculations of risk, on which officials base their decisions in emergencies, are based largely on probabilities. In the case of Sandy, as Sobel shows, the essential improbability of the phenomenon led them to underestimate the threat and thus delay emergency measures.

Sobel goes on to make the argument, as have many others, that human beings are intrinsically unable to prepare for rare events. But has this really been the case throughout human history? Or is it rather an aspect of the unconscious patterns of thought—or "common sense"—that gained ascendancy with a growing faith in "the regularity of bourgeois life"? I suspect that human beings were generally catastrophists at heart until their instinctive awareness of the earth's unpredictability was gradually supplanted by a belief in uniformitarianism—a regime of ideas that was supported by scientific theories like Lyell's, and also by a range of governmental practices that were informed by statistics and probability.

It is a fact, in any case, that when early tremors jolted the Italian town of L'Aquila, shortly before the great earthquake of 2009, many townsfolk obeyed the instinct that prompts people who live in earthquake-prone areas to move to open

spaces. It was only because of a governmental intervention, intended to prevent panic, that they returned to their homes. As a result, a good number were trapped indoors when the earthquake occurred.

No such instinct was at work in New York during Sandy, where, as Sobel notes, it was generally believed that "losing one's life to a hurricane is . . . something that happens in faraway places" (he might just as well have said "dithyrambic lands"). In Brazil, similarly, when Hurricane Catarina struck the coast in 2004, many people did not take shelter because "they refused to believe that hurricanes were possible in Brazil."

But in the era of global warming, nothing is really far away; there is no place where the orderly expectations of bourgeois life hold unchallenged sway. It is as though our earth had become a literary critic and were laughing at Flaubert, Chatterjee, and their like, mocking *their* mockery of the "prodigious happenings" that occur so often in romances and epic poems.

This, then, is the first of the many ways in which the age of global warming defies both literary fiction and contemporary common sense: the weather events of this time have a very high degree of improbability. Indeed, it has even been proposed that this era should be named the "catastrophozoic" (others prefer such phrases as "the long emergency" and "the Penumbral Period"). It is certain in any case that these are not ordinary times: the events that mark them are not easily accommodated in the deliberately prosaic world of serious prose fiction.

Poetry, on the other hand, has long had an intimate relationship with climatic events: as Geoffrey Parker points out, John Milton began to compose *Paradise Lost* during a winter of extreme cold, and "unpredictable and unforgiving changes in the climate are central to his story. Milton's fictional world, like the real one in which he lived, was . . . a 'universe of death' at the mercy of extremes of heat and cold." This is a universe

very different from that of the contemporary literary novel.

I am, of course, painting with a very broad brush: the novel's infancy is long past, and the form has changed in many ways over the last two centuries. Yet, to a quite remarkable degree, the literary novel has also remained true to the destiny that was charted for it at birth. Consider that the literary movements of the twentieth century were almost uniformly disdainful of plot and narrative; that an ever-greater emphasis was laid on style and "observation," whether it be of everyday details, traits of character, or nuances of emotion—which is why teachers of creative writing now exhort their students to "show, don't tell."

Yet fortunately, from time to time, there have also been movements that celebrated the unheard-of and the improbable: surrealism for instance, and most significantly, magical realism, which is replete with events that have no relation to the calculus of probability.

There is, however, an important difference between the weather events that we are now experiencing and those that occur in surrealist and magical realist novels: improbable though they might be, these events are neither surreal nor magical. To the contrary, these highly improbable occurrences are overwhelmingly, urgently, astoundingly real. The ethical difficulties that might arise in treating them as magical or metaphorical or allegorical are obvious perhaps. But there is another reason why, from the writer's point of view, it would serve no purpose to approach them in that way: because to treat them as magical or surreal would be to rob them of precisely the quality that makes them so urgently compelling—which is that they are actually happening on this earth, at this time.

8.

The Sundarbans are nothing like the forests that usually figure in literature. The greenery is dense, tangled, and low; the canopy is not above but around you, constantly clawing at your skin and your clothes. No breeze can enter the thickets of this forest; when the air stirs at all it is because of the buzzing of flies and other insects. Underfoot, instead of a carpet of softly decaying foliage, there is a bank of slippery, knee-deep mud, perforated by the sharp points that protrude from mangrove roots. Nor do any vistas present themselves except when you are on one of the hundreds of creeks and channels that wind through the landscape—and even then it is the water alone that opens itself; the forest withdraws behind its muddy ramparts, disclosing nothing.

In the Sundarbans, tigers are everywhere and nowhere. Often when you go ashore, you will find fresh tiger prints in the mud, but of the animal itself you will see nothing: glimpses of tigers are exceedingly uncommon and rarely more than fleeting. Yet you cannot doubt, since the prints are so fresh, that a tiger is somewhere nearby; and you know that it is probably watching you. In this jungle, concealment is so easy for an animal that it could be just a few feet away. If it charged, you would not see it till the last minute, and even if you did, you would not be able to get away; the mud would immobilize you.

Scattered through the forest are red rags, fluttering on branches. These mark the sites where people have been killed by tigers. There are many such killings every year; exactly how many no one knows because the statistics are not reliable. Nor is this anything new; in the nineteenth century, tens of thousands were killed by tigers. Suffice it to say that in some villages every household has lost a member to a tiger; everyone has a story to tell.

In these stories a great deal hinges on the eyes; seeing is one of their central themes; *not* seeing is another. The tiger is watching you; you are aware of its gaze, as you always are, but you do not see it; you do not lock eyes with it until it launches its charge, and at that moment a shock courses through you and you are immobilized, frozen.

The folk epic of the Sundarbans, *Bon Bibir Johuranama* (*The Miracles of Bon Bibi*), comes to a climax in one such moment of mutual beholding, when the tiger demon, Dokkhin Rai, locks eyes with the protagonist, a boy called Dukhey.

> It was then from afar, that the demon saw Dukhey . . .
> Long had he hungered for this much-awaited prize; in an instant he assumed his tiger disguise.
> "How long has it been since human flesh came my way? Now bliss awaits me in the shape of this boy Dukhey."
> On the far mudbank Dukhey caught sight of the beast: "that tiger is the demon and I'm to be his feast."
> Raising its head, the tiger reared its immense back; its jowls filled like sails as it sprang to attack.
> The boy's life took wing, on seeing this fearsome sight.

Many stories of encounters with tigers hinge upon a moment of mutual recognition like this one. To look into the tiger's eyes is to recognize a presence of which you are already aware; and in that moment of contact you realize that this presence possesses a similar awareness of you, even though it is not human. This mute exchange of gazes is the only communication that is possible between you and this presence—yet communication it undoubtedly is.

But what is it that you are communicating with, at this moment of extreme danger, when your mind is in a state unlike any you've ever known before? An analogy that is some-

times offered is that of seeing a ghost, a presence that is not of this world.

In the tiger stories of the Sundarbans, as in my experience of the tornado, there is, as I noted earlier, an irreducible element of mystery. But what I am trying to suggest is perhaps better expressed by a different word, one that recurs frequently in translations of Freud and Heidegger. That word is *uncanny*—and it is indeed with uncanny accuracy that my experience of the tornado is evoked in the following passage: "In dread, as we say, 'one feels something uncanny.' What is this 'something' and this 'one'? We are unable to say what gives 'one' that uncanny feeling. 'One' just feels it generally."

It is surely no coincidence that the word *uncanny* has begun to be used, with ever greater frequency, in relation to climate change. Writing of the freakish events and objects of our era, Timothy Morton asks, "Isn't it the case, that the effect delivered to us in the [unaccustomed] rain, the weird cyclone, the oil slick is something uncanny?" George Marshall writes, "Climate change is inherently uncanny: Weather conditions, and the high-carbon lifestyles that are changing them, are extremely familiar and yet have now been given a new menace and uncertainty."

No other word comes close to expressing the strangeness of what is unfolding around us. For these changes are not merely strange in the sense of being unknown or alien; their uncanniness lies precisely in the fact that in these encounters we recognize something we had turned away from: that is to say, the presence and proximity of nonhuman interlocutors.

Yet now our gaze seems to be turning again; the uncanny and improbable events that are beating at our doors seem to have stirred a sense of recognition, an awareness that humans were never alone, that we have always been surrounded by beings of all sorts who share elements of that which we had

thought to be most distinctively our own: the capacities of will, thought, and consciousness. How else do we account for the interest in the nonhuman that has been burgeoning in the humanities over the last decade and over a range of disciplines; how else do we account for the renewed attention to panpsychism and the metaphysics of Alfred North Whitehead; and for the rise to prominence of object-oriented ontology, actor-network theory, the new animism, and so on?

Can the timing of this renewed recognition be mere coincidence, or is the synchronicity an indication that there are entities in the world, like forests, that are fully capable of inserting themselves into our processes of thought? And if that were so, could it not *also* be said that the earth has itself intervened to revise those habits of thought that are based on the Cartesian dualism that arrogates all intelligence and agency to the human while denying them to every other kind of being?

This possibility is not, by any means, the most important of the many ways in which climate change challenges and refutes Enlightenment ideas. It is, however, certainly the most uncanny. For what it suggests—indeed proves—is that nonhuman forces have the ability to intervene directly in human thought. And to be alerted to such interventions is also to become uncannily aware that conversations among ourselves have always had other participants: it is like finding out that one's telephone has been tapped for years, or that the neighbors have long been eavesdropping on family discussions.

But in a way it's worse still, for it would seem that those unseen presences actually played a part in shaping our discussions without our being aware of it. And if these are real possibilities, can we help but suspect that all the time that we imagined ourselves to be thinking about apparently inanimate objects, we were ourselves being "thought" by other entities? It is almost as if the mind-altering planet that Stanislaw Lem

imagined in *Solaris* were our own, familiar Earth: what could be more uncanny than this?

These possibilities have many implications for the subject that primarily concerns me here, literary fiction. I will touch on some of these later, but for now I want to attend only to the aspect of the uncanny.

On the face of it, the novel as a form would seem to be a natural home for the uncanny. After all, have not some of the greatest novelists written uncanny tales? The ghost stories of Charles Dickens, Henry James, and Rabindranath Tagore come immediately to mind.

But the environmental uncanny is not the same as the uncanniness of the supernatural: it is different precisely because it pertains to nonhuman forces and beings. The ghosts of literary fiction are not human either, of course, but they are certainly represented as projections of humans who were once alive. But animals like the Sundarbans tiger, and freakish weather events like the Delhi tornado, have no human referents at all.

There is an additional element of the uncanny in events triggered by climate change, one that did not figure in my experience of the Delhi tornado. This is that the freakish weather events of today, despite their radically nonhuman nature, are nonetheless animated by cumulative human actions. In that sense, the events set in motion by global warming have a more intimate connection with humans than did the climatic phenomena of the past—this is because we have all contributed in some measure, great or small, to their making. They are the mysterious work of our own hands returning to haunt us in unthinkable shapes and forms.

All of this makes climate change events peculiarly resistant to the customary frames that literature has applied to "Nature": they are too powerful, too grotesque, too dangerous, and too accusatory to be written about in a lyrical, or elegiac, or

romantic vein. Indeed, in that these events are not entirely of Nature (whatever that might be), they confound the very idea of "Nature writing" or ecological writing: they are instances, rather, of the uncanny intimacy of our relationship with the nonhuman.

More than a quarter century has passed since Bill McKibben wrote, "We live in a post-natural world." But did "Nature" in this sense ever exist? Or was it rather the deification of the human that gave it an illusory apartness from ourselves? Now that nonhuman agencies have dispelled that illusion, we are confronted suddenly with a new task: that of finding other ways in which to imagine the unthinkable beings and events of this era.

9.

In the final part of my novel *The Hungry Tide*, there is a scene in which a cyclone sends a gigantic storm surge into the Sundarbans. The wave results in the death of one of the principal characters, who gives his life protecting another.

This scene was extraordinarily difficult to write. In preparation for it, I combed through a great deal of material on catastrophic waves—storm surges as well as tsunamis. In the process, as often happens in writing fiction, the plight of the book's characters, as they faced the wave, became frighteningly real.

The Hungry Tide was published in the summer of 2004. A few months after the publication, on the night of December 25, I was back in my family home in Kolkata. The next morning, on logging on to the web, I learned that a cataclysmic tsunami had been set off by a massive undersea earthquake in the Indian Ocean. Measuring 9.0 on the Richter scale, the quake's epicenter lay between the northernmost tip of Sumatra and the southernmost island in the Andaman and Nicobar

chain. Although the full extent of the catastrophe was not yet known, it was already clear that the toll in human lives would be immense.

The news had a deeply unsettling effect on me: the images that had been implanted in my mind by the writing of *The Hungry Tide* merged with live television footage of the tsunami in a way that was almost overwhelming. I became frantic; I could not focus on anything.

A couple of days later, I wrote to a newspaper and obtained a commission to write about the impact of the tsunami on the Andaman and Nicobar Islands. My first stop was the islands' capital city, Port Blair, which was thronged with refugees but had not suffered much damage itself: its location, above a sheltered cove, had protected it. After spending a few days there, I was able to board an Indian Air Force plane that was carrying supplies to one of the worst affected of the Nicobar Islands.

Unlike the Andamans, which rise steeply from the sea, the Nicobars are low-lying islands. Being situated close to the quake's epicenter, they had been very badly hit; many settlements had been razed. I visited a shoreside town called Malacca that had been reduced literally to its foundations: of the houses only the floors were left, and here and there the stump of a wall. It was as though the place had been hit by a bomb that was designed specifically to destroy all things human—for one of the strangest aspects of the scene was that the island's coconut palms were largely unaffected; they stood serenely amid the rubble, their fronds waving gently in the breeze that was blowing in from the sparkling, sun-drenched sea.

I wrote in my notebook: "The damage was limited to a half-mile radius along the shore. In the island's interior everything is tranquil, peaceful—indeed astonishingly beautiful. There are patches of tall, dark primary forest, beautiful padauk trees, and among these, in little clearings, huts built on stilts. . . . One

of the ironies of the situation is that the most upwardly mobile people on the island were living at its edges."

Such was the pattern of settlement here that the indigenous islanders lived mainly in the interior: they were largely unaffected by the tsunami. Those who had settled along the seashore, on the other hand, were mainly people from the mainland, many of whom were educated and middle class: in settling where they had, they had silently expressed their belief that highly improbable events belong not in the real world but in fantasy. In other words, even here, in a place about as far removed as possible from the metropolitan centers that have shaped middle-class lifestyles, the pattern of settlement had come to reflect the uniformitarian expectations that are rooted in the "regularity of bourgeois life."

At the air force base where my plane had landed there was another, even more dramatic, illustration of this. The functional parts of the base—where the planes and machinery were kept—were located to the rear, well away from the water. The living areas, comprised of pretty little two-story houses, were built much closer to the sea, at the edge of a beautiful, palm-fringed beach. As always in military matters, the protocols of rank were strictly observed: the higher the rank of the officers, the closer their houses were to the water and the better the view that they and their families enjoyed.

Such was the design of the base that when the tsunami struck these houses the likelihood of survival was small, and inasmuch as it existed at all, it was in inverse relation to rank: the commander's house was thus the first to be hit.

The sight of the devastated houses was disturbing for reasons beyond the immediate tragedy of the tsunami and the many lives that had been lost there: the design of the base suggested a complacency that was itself a kind of madness. Nor could the siting of these buildings be attributed to the

usual improvisatory muddle of Indian patterns of settlement. The base had to have been designed and built by a government agency; the site had clearly been chosen and approved by hardheaded military men and state appointed engineers. It was as if, in being adopted by the state, the bourgeois belief in the regularity of the world had been carried to the point of derangement.

A special place ought to be reserved in hell, I thought to myself, for planners who build with such reckless disregard for their surroundings.

Not long afterward, while flying into New York's John F. Kennedy airport, I looked out of the window and spotted Far Rockaway and Long Beach, the thickly populated Long Island neighborhoods that separate the airport from the Atlantic Ocean. Looking down on them from above, it was clear that those long rows of apartment blocks were sitting upon what had once been barrier islands, and that in the event of a major storm surge they would be swamped (as indeed they were when Hurricane Sandy hit the area in 2012). Yet it was clear also that these neighborhoods had not sprung up haphazardly; the sanction of the state was evident in the ordered geometry of their streets.

Only then did it strike me that the location of that base in the Nicobars was by no means anomalous; the builders had not in any sense departed from accepted global norms. To the contrary, they had merely followed the example of the European colonists who had founded cities like Bombay (Mumbai), Madras (Chennai), New York, Singapore, and Hong Kong, all of which are sited directly on the ocean. I understood also that what I had seen in the Nicobars was but a microcosmic expression of a pattern of settlement that is now dominant around the world: proximity to the water is a sign of affluence and education; a beachfront location is a status symbol; an ocean view greatly increases the value of real estate. A colonial vi-

sion of the world, in which proximity to the water represents power and security, mastery and conquest, has now been incorporated into the very foundations of middle-class patterns of living across the globe.

But haven't people always liked to live by the water?

Not really; through much of human history, people regarded the ocean with great wariness. Even when they made their living from the sea, through fishing or trade, they generally did not build large settlements on the water's edge: the great old port cities of Europe, like London, Amsterdam, Rotterdam, Stockholm, Lisbon, and Hamburg, are all protected from the open ocean by bays, estuaries, or deltaic river systems. The same is true of old Asian ports: Cochin, Surat, Tamluk, Dhaka, Mrauk-U, Guangzhou, Hangzhou, and Malacca are all cases in point. It is as if, before the early modern era, there had existed a general acceptance that provision had to be made for the unpredictable furies of the ocean—tsunamis, storm surges, and the like.

An element of that caution seems to have lingered even after the age of European global expansion began in the sixteenth century: it was not till the seventeenth century that colonial cities began to rise on seafronts around the world. Mumbai, Chennai, New York, and Charleston were all founded in this period. This would be followed by another, even more confident wave of city building in the nineteenth century, with the founding of Singapore and Hong Kong. These cities, all brought into being by processes of colonization, are now among those that are most directly threatened by climate change.

10.

Mumbai and New York, so different in so many ways, have in common that their destinies came to be linked to the British Empire at about the same time: the 1660s.

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NOTES

PART I

4 ignorance to knowledge: “Recognition . . . is a change from ignorance to knowledge, disclosing either a close relationship or enmity, on the part of people marked out for good or bad fortune.” Aristotle, *Poetics*, tr. Malcolm Heath (London: Penguin 1996), 18.

5 lies within oneself: In the phrasing of Giorgio Agamben, the philosopher, these are moments in which potentiality turns “back upon itself to give itself to itself” (*Homo Sacer: Sovereign Power and Bare Life*, tr. Daniel Heller-Roazen [Stanford, CA: Stanford University Press, 1998], 46).

7 genre of science fiction: Barbara Kingsolver’s *Flight Behavior* and Ian McEwan’s *Solar*, both of which were widely reviewed by literary journals, are rare exceptions.

7 feedback loop: In Gavin Schmidt and Joshua Wolfe’s definition: “The concept of feedback is at the heart of the climate system and is responsible for much of its complexity. In the climate everything is connected to everything else, so when one factor changes, it leads to a long chain of changes in other components, which leads to more changes, and so on. Eventually, these changes end up affecting the factor that instigated the initial change. If this feedback amplifies the initial change, it’s described as positive, and if it dampens the change, it is negative.” See *Climate Change: Picturing the Science*, ed. Gavin Schmidt and Joshua Wolfe (New York: W. W. Norton, 2008), 11.

8 wild has become the norm: Lester R. Brown writes, “climate instability is becoming the new norm.” See *World on the Edge: How*

to Prevent Environmental and Economic Collapse (New York: W. W. Norton, 2011), 47.

8 "stories our civilization tells itself": See dark-mountain.net; and see also John H. Richardson, "When the End of Human Civilization Is Your Day Job," *Esquire*, July 7, 2015.

9 era of the Anthropocene: Dipesh Chakrabarty, "The Climate of History: Four Theses," *Critical Inquiry* 35 (Winter 2009).

9 "processes of the earth": The quote is from Naomi Oreskes, "The Scientific Consensus on Climate Change: How Do We Know We're Not Wrong," in *Climate Change: What It Means for Us, Our Children and Our Grandchildren*, ed. Joseph F. C. DiMento and Pamela Doughman (Cambridge, MA: MIT Press, 2007). For a discussion of the genealogy of the concept of the Anthropocene, see Paul J. Crutzen, "Geology of Mankind," *Nature* 415 (January 2002): 23; and Will Steffen, Jacques Grinevald, Paul Crutzen, and John McNeill, "The Anthropocene: Conceptual and Historical Perspectives," *Philosophical Transactions of the Royal Society* 369 (2011): 842–67.

10 the wind in our hair: Stephanie LeMenager calls this "the road-pleasure complex" in *Living Oil: Petroleum Culture in the American Century* (Oxford: Oxford University Press, 2014,) 81.

11 Bangkok uninhabitable: Cf. James Hansen: '"Parts of [our coastal cities] would still be sticking above the water, but you couldn't live there." http://www.thedailybeast.com/articles/2015/07/20/climate-seer-james-hansen-issues-his-direst-forecast-yet.html.

11 Great Derangement: As the historian Fredrik Albritton Jonsson notes, if we consider the transgression of the "planetary boundaries that are necessary to maintain the Earth system 'in a Holocene-like state' . . . our current age of fossil fuel abundance resembles nothing so much as a giddy binge rather than a permanent achievement of human ingenuity" ("The Origins of Cornucopianism: A Preliminary Genealogy," *Critical Historical Studies,* Spring 2014, 151).

14 meteorological history: The only part of the Indian subcontinent where tornadoes occur frequently is in the Bengal Delta, particularly Bangladesh. Cf. Someshwar Das, U. C. Mohanty, Ajit Tyagi, et al., "The SAARC Storm: A Coordinated Field Experiment

on Severe Thunderstorm Observations and Regional Modeling over the South Asian Region," *American Meteorological Society*, April 2014, 606.

16 "being aware of it": Ian Hacking, *The Emergence of Probability* (Cambridge: Cambridge University Press, 1975), Kindle edition, loc. 194.

17 "into the foreground": Franco Moretti, "Serious Century: From Vermeer to Austen," in *The Novel, Volume 1*, ed. Franco Moretti (Princeton, NJ: Princeton University Press, 2006), 372.

17 regime of thought and practice: Cf. Giorgio Agamben on Carl Schmitt, "the true life of the rule is the exception," in *Homo Sacer*, tr. Daniel Heller-Roazen, 137.

18 "pictures of Bengali life": Bankim Chandra Chatterjee, "Bengali Literature," first published anonymously in *Calcutta Review* 104 (1871). Digital Library of India: http://en.wikisource.org/wiki/Bengali_Literature.

18 early 1860s: See also my essay, "The March of the Novel through History: The Testimony of My Grandfather's Bookcase," in the collection *The Imam and the Indian* (New Delhi: Ravi Dayal, 2002).

19 "blond cornfields": Gustave Flaubert, *Madame Bovary*, tr. Eleanor Marx-Aveling (London: Wordsworth Classics, 1993), 53.

19 "no miracles at all": Franco Moretti, *The Bourgeois* (London: Verso, 2013), 381. There is an echo here of Carl Schmitt's observation: "The idea of the modern constitutional state triumphed together with deism, a theology and metaphysics that banished the miracle from the world. . . . The rationalism of the Enlightenment rejected the exception in every form" (*Political Theology: Four Chapters on the Concept of Sovereignty* [University of Chicago Press, 2005], 36–37).

20 "change in the present": Spencer R. Weart, *The Discovery of Global Warming* (Cambridge, MA: Harvard University Press, 2003), 9.

20 "does not make leaps": Stephen Jay Gould, *Time's Arrow, Time's Cycle: Myth and Metaphor in the Discovery of Geological Time* (Cambridge, MA: Harvard University Press, 1987), 173.

20 jump, if not leap: The theory of punctuated equilibrium, as articulated by Stephen Jay Gould and Niles Eldredge, proposed "that the emergence of new species was not a constant process but

moved in fits and starts: it was not gradual but punctuated." See John L. Brooke, *Climate Change and the Course of Global History: A Rough Journey* (New York: Cambridge University Press, 2014), 29.

20 "'both and neither'": Gould, *Time's Arrow, Time's Cycle*, 191.

20 "short-lived cataclysmic events": http://geography.about.com/od/physicalgeography/a/uniformitarian.htm.

21 "immaterial and supernatural agents": Gould, *Time's Arrow, Time's Cycle*, 108–9.

21 "victim with her cold beams": Chatterjee, "Bengali Literature."

21 "nightingales in shady groves": Flaubert, *Madame Bovary*, 28.

22 "resent its interference": Chatterjee, "Bengali Literature."

22 "reigned supreme": Brooke, *Climate Change and the Course of Global History*.

22 "events in the stars": Quoted in Gould, *Time's Arrow, Time's Cycle*, 176.

23 "covers of popular magazines": Elizabeth Kolbert, *The Sixth Extinction: An Unnatural History* (New York: Henry Holt, 2014), 76. See also Jan Zalasiewicz and Mark Williams, *The Goldilocks Planet: The Four Billion Year Story of Earth's Climate* (Oxford: Oxford University Press, 2012), Kindle edition, loc. 3042, and Gwynne Dyer, *Climate Wars: The Fight for Survival as the World Overheats* (Oxford: Oneworld Books, 2010), Kindle edition, loc. 3902.

23 "basis of intelligibility": Gould, *Time's Arrow, Time's Cycle*, 10.

23 "'carry me with you!'": Flaubert, *Madame Bovary*, 172–73.

25 recorded meteorological history: Adam Sobel, *Storm Surge: Hurricane Sandy, Our Changing Climate, and Extreme Weather of the Past and Future* (New York: HarperCollins, 2014), Kindle edition, locs. 91–105.

25 its impacts: Ibid., locs. 120, 617–21.

26 "faraway places": Ibid., loc. 105.

26 "possible in Brazil": Mark Lynas, *Six Degrees: Our Future on a Hotter Planet* (New York: HarperCollins, 2008), 41.

26 named the "catastophozoic": Kolbert, *The Sixth Extinction*, 107.

26 "the long emergency" and "Penumbral Period": David Orr, *Down to the Wire: Confronting Climate Collapse* (Oxford: Oxford University Press, 2009), 27–32; and Naomi Oreskes and Erik M. Conway, *The Collapse of Western Civilization: A View from the Future* (New York: Columbia University Press, 2014), 4.

26 "extremes of heat and cold": Geoffrey Parker, *Global Crisis: War, Climate Change, and Catastrophe in the Seventeenth Century* (New Haven, CT: Yale University Press, 2013), Kindle edition, loc. 17574.

28 were killed by tigers: In his book, *The Royal Tiger of Bengal: His Life and Death* (London: J. and A. Churchill, 1875), Joseph Fayrer records that between 1860 and 1866 4,218 people were killed by tigers in Lower Bengal.

29 this fearsome sight: Amitav Ghosh, *The Hungry Tide* (New York: Houghton Mifflin Harcourt, 2005).

30 "feels it generally": Martin Heidegger, *Existence and Being*, intro. Werner Brock, tr. R. F. C. Hull and Alan Crick (Washington, DC: Gateway Editions, 1949), 336.

30 "something uncanny": Timothy Morton, *Hyperobjects* (Minneapolis: University of Minnesota Press, 2013), Kindle edition, loc. 554.

30 "menace and uncertainty": George Marshall, *Don't Even Think about It: Why Our Brains Are Wired to Ignore Climate Change* (New York: Bloomsbury, 2014), 95.

31 processes of thought: Cf. Eduardo Kohn, *How Forests Think: Toward an Anthropology beyond the Human* (Berkeley: University of California Press, 2013).

33 relationship with the nonhuman: Cf. Michael Shellenberger and Ted Nordhaus, "The Death of Environmentalism: Global Warming Politics in a Post-Environmental World" (Oakland, CA: Breakthrough Institute, 2007): "The concepts of 'nature' and 'environment' have been thoroughly deconstructed. Yet they retain their mythic and debilitating power within the environmental movement and the public at large" (12).

33 "post-natural world": Bill McKibben, *The End of Nature* (New York: Random House, 1989), 49.

38 tides and the seasons: Anuradha Mathur and Dilip da Cunha make this point at some length in their excellent book, *SOAK: Mumbai in an Estuary* (New Delhi: Rupa Publications, 2009).

38 and on Salsette: I am grateful to Rahul Srivastava, the urban theorist and cofounder of URBZ (http://urbz.net/about/people/), for this insight.

38 a chest of tea: Bennett Alan Weinberg and Bonnie K. Bealer, *The*

World of Caffeine: The Science and Culture of the World's Most Popular Drug (New York: Routledge, 2000), 161.

39 "milieu of colonial power": Anuradha Mathur and Dilip da Cunha, *SOAK*, 47.

39 their colonial origins: The British geographer James Duncan describes the colonial city as a "political tract written in space and carved in stone. The landscape was part of the practice of power." Quoted in Karen Piper, *The Price of Thirst: Global Water Inequality and the Coming Chaos* (Minneapolis: University of Minnesota Press, 2014), Kindle edition, loc. 3168.

39 "an island once": Govind Narayan, *Govind Narayan's Mumbai: An Urban Biography from 1863*, tr. Murali Ranganathan (London: Anthem Press, 2009), 256. I am grateful to Murali Ranganathan for clarifying many issues relating to the topography of Mumbai.

39 "concentration of risk": Cf. Aromar Revi, "Lessons from the Deluge," *Economic and Political Weekly* 40, no. 36 (September 3–8, 2005): 3911–16, 3912.

40 cyclonic activity: A 2010 report published jointly by the India Meteorological Department and National Disaster Management Authority places the coastal districts of the India's western states in the lowest category of proneness to cyclones (table 9).

40 west coast of India: Earthquakes of 5.8 and 5.0 magnitude were recorded in the Owen fracture zone on October 2, 2013, and November 12, 2014. For details, see http://dynamic.pdc.org/snc/prod/40358/rr.html & http://www.emsc-csem.org/Earthquake/earthquake.php?id=408320.

40 "NW Indian Ocean": M. Fournier, N. Chamot-Rooke, M. Rodriguez, et al., "Owen Fracture Zone: The Arabia-India Plate Boundary Unveiled," *Earth and Planetary Science Letters* 302 nos. 1–2 (February 1, 2011): 247–52.

41 after the monsoons: Hiroyuki Murakami et al., "Future Changes in Tropical Cyclone Activity in the North Indian Ocean Projected by High Resolution MRI-AGCMs," *Climate Dynamics* 40 (2013): 1949–68, 1949.

41 region's wind patterns: Amato T. Evan, James P. Kossin, et al., "Arabian Sea Tropical Cyclones Intensified by Emissions of Black

Carbon and Aerosols," *Nature* 479 (2011): 94–98.

43 "minor cyclonic storms": *Gazetteer of Bombay City and Island*, Vol. I (1909), 96. I am grateful to Murali Ranganathan for providing me with this reference.

43 "end of all things": Quoted in *Gazetteer of Bombay City and Island*, Vol. I (1909), 97.

43 "persons were killed": Ibid., 98.

44 people were killed: Ibid., 99.

44 "number and intensity": Ibid.

44 intensity scale: On the Saffir-Simpson hurricane intensity scale, wind speeds of 75 mph are the benchmark for a Category 1 hurricane. In the Tropical Cyclone Intensity Scale used by the India Meteorological Department, any storm with wind speeds of over 39 kmph counts as a "cyclonic storm," hence this storm was named Cyclone Phyan.

45 single day: R. B. Bhagat et al., "Mumbai after 26/7 Deluge: Issues and Concerns in Urban Planning," *Population and Environment* 27, no. 4 (March 2006): 337–49, 340.

45 estuarine location: I am deeply grateful to Rahul Srivastava, Manasvini Hariharan, Apoorva Tadepalli, and the team at URBZ for their help with the research for this section.

45 filth-clogged ditches: In "Drainage Problems of Brihan Mumbai," B. Arunachalam provides a concise account of how Mumbai's hydrological systems have been altered over time (*Economic and Political Weekly* 40, no. 36 [September 3–9, 2005]: 3909–11, 3909).

45 absorptive ability: Cf. Vidyadhar Date, "Mumbai Floods: The Blame Game Begins," *Economic and Political Weekly* 40, no. 34 (August 20–26, 2005): 3714–16, 3716; and Ranger et al., "An Assessment of the Potential Impact of Climate Change on Flood Risk in Mumbai," *Climate Change* 104 (2011): 139–67, 142, 146; see also R. B. Bhagat et al., "Mumbai after 26/7 Deluge," 342.

46 1.5 million: P. C. Sehgal and Teki Surayya, "Innovative Strategic Management: The Case of Mumbai Suburban Railway System," *Vikalpa* 36, no. 1 (January–March 2011): 63.

46 knocked out as well: Aromar Revi, "Lessons from the Deluge," 3913.

46 suffered damage: The paragraphs above are based largely on the

Fact Finding Committee on Mumbai Floods, Final Report, vol. 1, 2006, 13–15.

47 fishing boat: Vidyadhar Date, "Mumbai Floods," 3714.

47 trapped by floodwaters: Aromar Revi, "Lessons from the Deluge," 3913.

47 homes to strangers: Cf. Carsten Butsch et al., "Risk Governance in the Megacity Mumbai/India—A Complex Adaptive System Perspective," *Habitat International* (2016), http://dx.doi.org/10.1016/j.habitatint.2015.12.017, 5.

47 "of the partition": Aromar Revi, "Lessons from the Deluge," 3912.

47 even the courts: See Ranger et al., "An Assessment of the Potential Impact of Climate Change on Flood Risk in Mumbai," 156.

47 swamped by floodwaters: Carsten Butsch et al. note that while many improvements have been made to Mumbai's warning systems and disaster management practices, "there are also doubts about Mumbai's disaster preparedness. First some of the infrastructures created, are not maintained as good practice would demand; second, many of the measures announced have not been finalized (especially the renovation of the city's water system) and third, informal practices prohibit planning and applying measures." ("Risk Governance in the Megacity Mumbai/India," 9–10).

47 in recent years: Because of emergency measures the death toll of the 2013 Category 5 storm, Cyclone Phailin, was only a few dozen. See the October 14, 2013, CNN report, "Cyclone Phailin: India Relieved at Low Death Toll."

48 planning for disasters: Ranger et al. observe that while Mumbai administration's risk reducing measures are commendable "they do not appear to consider the potential impacts of climate change on the long-term planning horizon." ("An Assessment of the Potential Impact of Climate Change on Flood Risk in Mumbai," 156).

48 "post-disaster response": Friedemann Wenzel et al., "Megacities—Megarisks," *Natural Hazards* 42 (2007): 481–91, 486.

48 disasters of this kind: The Municipal Corporation of Great Mumbai's booklet *Standard Operating Procedures for Disaster Management Control* (available at http://www.mcgm.gov.in/irj/portalapps/com.mcgm.aDisasterMgmt/docs/MCGM_SOP.pdf) is

explicitly focused on floods and makes no mention of cyclones. Cyclones are mentioned only generically in the Municipal Corporation's 2010 publication *Disaster Risk Management Master Plan: Legal and Institutional Arrangements; Disaster Risk Management in Greater Mumbai*, and that too mainly in the context of directives issued by the National Disaster Management Authority, which was established by the country's Disaster Management Act of 2005. The *Maharashtra State Disaster Management Plan* (draft copy) is far more specific, and it includes a lengthy section on cyclones (section 10.4) and the following recommendation: "Evacuate people from unsafe buildings/structures and shift them to relief camps/sites." However, its primary focus is on rural areas, and it does not make any reference (probably for jurisdictional reasons) to a possible evacuation of Mumbai (the plan is available here: http://gadchiroli.nic.in/pdf-files/state-disaster.pdf). The *Greater Mumbai Disaster Management Action Plan: Risk Assessment and Response Plan*, vol. 1, does recognize the threat of cyclones, and even lists the areas that may need to be evacuated (section 2.8). But this list accounts for only a small part of the city's population; the plan does not provide for the possibility that an evacuation on a much larger scale, involving most of the city's people, may be necessary. The plan is available here: http://www.mcgm.gov.in/irj/portalapps/com.mcgm.aDisasterMgmt/docs/Volume%201%20(Final).pdf.

48 projects are located: According to an article published in the *Indian Express* on April 30, 2015, "60 sea-front projects, mostly super luxury residences," were waiting for clearance "along Mumbai's western shoreline." http://indianexpress.com/article/cities/mumbai/govt-forms-new-panel-fresh-hope-for-117-stalled-crz-projects/. The Maharashtra government is also opening many unbuilt sea-facing areas, like the city's old salt pans, to construction (see *The Hindu's Business Line* of August 22, 2015: http://m.thehindubusinessline.com/news/national/salt-pan-lands-in-mumbai-to-be-used-for-development-projects/article7569641.ece).

49 corrugated iron: Carsten Butsch et al., "Risk Governance in the Megacity Mumbai/India," 5.

50 Arabian Sea: Cf. C. W. B. Normand, *Storm Tracks in the Arabian Sea*,

India Meteorological Department, 1926. I am grateful to Adam Sobel for this reference.

51 city as well: During the 2005 deluge "The waterlogging lasted for over seven days in parts of the suburbs and the flood water level had risen by some feet in many built-up areas." B. Arunachalam, "Drainage Problems of Brihan Mumbai," 3909.

51 illness and disease: See Carsten Butsch et al., "Risk Governance in the Megacity Mumbai/India," 4.

51 forty thousand beds: Cf. Municipal Corporation of Greater Mumbai's *City Development Plan*, section on "Health" (9.1; available here: http://www.mcgm.gov.in/irj/go/km/docs/documents/MCGM%20Department%20List/City%20Engineer/Deputy%20City%20Engineer%20(Planning%20and%20Design)/City%20Development%20Plan/Health.pdf).

51 urban limits: Aromar Revi, "Lessons from the Deluge," 3912.

51 rising seas: Natalie Kopytko, "Uncertain Seas, Uncertain Future for Nuclear Power," *Bulletin of the Atomic Scientists* 71, no. 2 (2015): 29–38.

52 "safety risks": Ibid., 30–31.

52 models predict: "All the models are indicating an increase in mean annual rainfall as compared to the observed reference mean of 1936 mm, and the average of all the models in 2350 mm [by 2071–2099]." Arun Rana et al., "Impact of Climate Change on Rainfall over Mumbai using Distribution-Based Scaling of Global Climate Model Projections," *Journal of Hydrology: Regional Studies* 1 (2014): 107–28, 118. See also Dim Coumou and Stefan Rahmstorf, "A Decade of Weather Extremes," *Nature Climate Change* 2 (July 2012): 491–96: "Many lines of evidence . . . strongly indicate that some types of extreme weather event, most notably heatwaves and precipitation extremes, will greatly increase in a warming climate and have already done so" (494).

53 become uninhabitable: Aromar Revi notes: "There is a clear need to rationalize land cover and land use in Greater Mumbai in keeping with rational ecological and equitable economic considerations. . . . The key concern here is that developers' interests do not overpower 'public interest,' that the rights of the poor are upheld;

else displacement from one location will force them to relocate to another, often more risk-prone location" ("Lessons from the Deluge," 3914).

53 threatened neighborhoods: *Climate Risks and Adaptation in Asian Coastal Megacities: A Synthesis Report*, World Bank, 2010 (available at file:///C:/Users/chres/Desktop/Current/research/coastal_megacities_fullreport.pdf). The report includes a ward-by-ward listing of the areas of Kolkata that are most vulnerable to climate change (88).

55 "below this point": http://www.nytimes.com/2011/04/21/world/asia/21stones.html.

56 with the "sublime": Cf. William Cronon, "The Trouble with Wilderness; or Getting Back to the Wrong Nature," in *Uncommon Ground: Rethinking the Human Place in Nature*, ed. William Cronon (New York: W. W. Norton, 1995), 69–90: "By the second half of the nineteenth century, the terrible awe that Wordsworth and Thoreau regarded as the appropriately pious stance to adopt in the presence of their mountaintop God was giving way to a much more comfortable, almost sentimental demeanor" (6).

57 they had caused: Cf. A. K. Sen Sarma, "Henry Piddington (1797–1858): A Bicentennial Tribute," in *Weather* 52, no. 6 (1997): 187–93.

57 "five to fifteen feet": Henry Piddington, "A letter to the most noble James Andrew, Marquis of Dalhousie, Governor-General of India, on the storm wave of the cyclones in the Bay of Bengal and their effects in the Sunderbunds, Baptist Mission Press" (Calcutta, 1853). Quoted in A. K. Sen Sarma, "Henry Piddington (1797–1858): A Bicentennial Tribute."

60 "stretches of farmland": Adwaita Mallabarman, *A River Called Titash*, tr. Kalpana Bardhan (Berkeley: University of California Press, 1993), 16–17.

60 "geography books": Ibid., 12.

61 "Flower-Fruit Mountain": *The Journey to the West*, tr. and ed. Anthony C. Yu (Chicago: University of Chicago Press, 1977.

62 "had to be evacuated": David Lipset, "Place in the Anthropocene: A Mangrove Lagoon in Papua New Guinea in the Time of Rising Sea-

Levels," *Hau: Journal of Ethnographic Theory* 4, no. 3 (2014): 215–43, 233.

63 "inhuman nature": Henry David Thoreau, *In the Maine Woods* (1864).

64 likes and dislikes: Julie Cruikshank, *Do Glaciers Listen? Local Knowledge, Colonial Encounters and Social Imagination* (Vancouver: University of British Columbia Press, 2005), 8.

64 "living and non-living": Julia Adeney Thomas, "The Japanese Critique of History's Suppression of Nature," *Historical Consciousness, Historiography and Modern Japanese Values*, International Symposium in North America, International Research Center for Japanese Studies, Kyoto, Japan, 2002, 234.

64 "never saw an ape": Quoted by Giorgio Agamben in *The Open: Man and Animal*, tr. Kevin Attell (Stanford, CA: Stanford University Press, 2004), Kindle edition, loc. 230.

65 "words and texts": Michael S. Northcott, *A Political Theology of Climate Change* (Cambridge: Wm. B. Eerdmans Publishing, 2013), 34. See also Lynn White, "The Historical Roots of Our Ecological Crisis," *Science* 155 (1967): "Christianity is the most anthropocentric religion the world has seen" (1205).

66 in recorded history: Alexander M. Stoner and Andony Melathopoulos, *Freedom in the Anthropocene: Twentieth-Century Helplessness in the Face of Climate Change* (New York: Palgrave, 2015), 10.

66 "without a Summer": Cf. Michael E. Mann, *The Hockey Stick and the Climate Wars* (New York: Columbia University Press, 2012), 39; Gillen D'Arcy Wood, "1816, the Year without a Summer," *BRANCH: Britain, Representation and Nineteenth-Century History*, ed. Dino Franco Felluga, extension of *Romanticism and Victorianism on the Net* (http://www.branchcollective.org/); and Gillen D'Arcy Wood, *Tambora: The Eruption That Changed the World* (Princeton, NJ: Princeton University Press, 2015).

67 John Polidori: Fiona MacCarthy, *Byron: Life and Legend* (New York: Farrar, Strauss and Giroux, 2002), 292.

67 "amid the darkness": Quoted by Gillen D'Arcy Wood, "1816, the Year without a Summer"; see also John Buxton, *Byron and Shelley: The History of a Friendship* (London: Macmillan, 1968), 10.

67 "August Darvell": Fiona MacCarthy, *Byron*, 292.

67 "vital warmth": Quoted by John Buxton, *Byron and Shelley*, 14.

68 "as we choose": Geoffrey Parker, *Global Crisis*, loc. 17871.

72 "umbrella": Margaret Atwood, *In Other Worlds: SF and the Human Imagination* (New York: Nan A. Talese/Doubleday, 2011).

74 "defend this autonomy": Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (London: Verso, 2011), Kindle edition, loc. 474.

74 First World War: Ibid., locs. 430, 578.

74 transportation and distribution: Ibid., locs. 680–797: "Whereas the movement of coal tended to follow dendritic networks, with branches at each end but a single main channel, creating potential choke points at several junctures, oil flowed along networks that had the properties of a grid, like an electricity network, where there is more than one possible path and the flow of energy can switch to avoid blockage or overcome breakdowns" (797).

74 from coal to oil: Ibid., loc. 653.

74 "energy flows": Ibid., loc. 645.

74 substance itself is not: Stephanie LeMenager's apt summation in *Living Oil*: "Oil has been shit and sex, the essence of entertainment" (92).

75 Sebastião Salgado: There are, however, many exceptions. For a full account, see the chapter "The Aesthetics of Petroleum" in Stephanie LeMenager's *Living Oil*.

76 "literally inconceivable": The piece is reprinted in the nonfiction collections published under the titles *The Imam and the Indian* (New Delhi: Penguin India, 2002) and *Incendiary Circumstances* (Boston: Houghton Mifflin, 2004).

77 "historical chronicle": Leo Tolstoy, "A Few Words Apropos of the Book *War and Peace*."

77 preceding forms: Donna Tussing Orwin, "Introduction," in *Tolstoy on War: Narrative Art and Historical Truth in "War and Peace,"* ed. Rick McPeak and Donna Tussing Orwin (Ithaca, NY: Cornell University Press, 2012), 3.

78 "being an egotist": *Eight Letters from Charlotte Brontë to George Henry Lewes*, November 1847–October 1850: http://www.bl.uk/collection-

items/eight-letters-from-charlotte-bront-to-george-henry-lewes-november-1847-october-1850.

78 "collective metamorphosis": Rob Nixon, *Slow Violence and the Environmentalism of the Poor* (Cambridge, MA: Harvard University Press, 2011), 87–88.

79 "Great Acceleration": Cf. Will Steffen, Jacques Grinevald, et al., "The Anthropocene: Conceptual and Historical Perspectives," *Philosophical Transactions of the Royal Society* 369 (2011): 842–67.

79 "produce isolation": Guy Debord, *The Society of the Spectacle*, 3rd ed., tr. Donald Nicholson-Smith (New York: Zone Books, 1994), thesis 28.

79 "as progress": Bruno Latour, *We Have Never Been Modern*, tr. Catherine Porter (Cambridge, MA: Harvard University Press, 1993), Kindle edition, loc. 1412.

79 powerful presence: As Latour notes, "the word 'modern' is always being thrown into the middle of a fight, in a quarrel where there are winners and losers." Ibid., loc. 269.

79 "used-up" after all: As John Barth once suggested in "The Literature of Exhaustion," in *The Friday Book: Essays and Other Nonfiction* (Baltimore: John Hopkins University Press, 1984).

80 avant la lettre: Thus, for example, the scientist and water expert Peter Gleick writes, in relation to the drought in California: "But here is what I fear, said best by John Steinbeck in *East of Eden*: 'And it never failed that during the dry years the people forgot about the rich years, and during the wet years they lost all memory of the dry years. It was always that way.'" (*Learning from Drought: Five Priorities for California*, February 10, 2014; available here: http://scienceblogs.com/significantfigures/index.php/2014/02/10/learning-from-drought-five-priorities-for-california/).

80 global temperatures: John L. Brooke, *Climate Change and the Course of Global History*, 551.

82 move beyond language: "We need . . . to 'decolonize thought,' in order to see that thinking is not necessarily circumscribed by language, the symbolic, or the human." Eduardo Kohn, *How Forests Think: Toward an Anthropology beyond the Human* (Berkeley: University of California Press, 2013), Kindle edition, loc. 949. See

also John Zerzan, *Running on Emptiness: The Pathology of Civilization* (Los Angeles: Feral House, 2002), 11: "Language seems often to close an experience, not to help ourselves be open to an experience."

83 has literary fiction: Sergio Fava discusses some of the visual artists who have addressed climate change in his book *Environmental Apocalypse in Science and Art: Designing Nightmares* (London: Routledge, 2013).

84 "the written word": Quoted in Arran E. Gare, *Postmodernism and the Environmental Crisis* (London: Routledge, 1995), 21.

84 "world more unlivable": The words are Franco Moretti's from *The Bourgeois* (London: Verso, 2013), 89.

PART II

88 half a million people: "7 Places Forever Changed by Eco-Disasters," http://www.mnn.com/earth-matters/wilderness-resources/photos/7-places-forever-changed-by-eco-disasters/bhola-island. See also George Monbiot, *Heat: How to Stop the Planet from Burning* (Cambridge, MA: South End Press, 2007), 21.

88 90 percent were women: Varsha Joshi, "Climate Change in South Asia: Gender and Health Concerns," in *Climate Change: An Asian Perspective*, ed. Surjit Singh et al. (Jaipur: Rawat Publications, 2012), 209–26, 213.

88 all along the coastline: Anwar Ali, "Impacts of Climate Change on Tropical Cyclones and Storm Surges in Bangladesh," in *Proceedings of the SAARC Seminar on Climate Variability in the South Asian Region and Its Impacts* (Dhaka: SAARC Meteorological Research Centre, 2003), 130–36, 133. See also M. J .B. Alam and F. Ahmed, "Modeling Climate Change: Perspective and Applications in the Context of Bangladesh," in *Indian Ocean Tropical Cyclones and Climate Change,* ed. Yassine Charabi (London: Springer, 2010), 15–23.

88 the oceans are rising: Cf. "World's River Deltas Sinking Due to Human Activity, Says New Study," http://www.sciencedaily.com/releases/2009/09/090920204459.htm. See also "Land Subsidence at Aquaculture Facilities in the Yellow River Delta, China," http://

onlinelibrary.wiley.com/doi/10.1002/grl.50758/abstract. In parts of India, land has subsided by more than thirty feet. Cf. Karen Piper, *The Price of Thirst*, loc. 581.

88 groundwater and oil: “Retreating Coastlines,” http://www.straitstimes.com/asia/retreating-coastlines.

89 being especially imperiled: Cf. “South Asia’s Sinking Deltas,” http://poleshift.ning.com/profiles/blogs/south-asia-s-sinking-deltas. See also “InSAR Measurements of Compaction and Subsidence in the Ganges-Brahmaputra Delta, Bangladesh,” http://onlinelibrary.wiley.com/doi/10.1002/2014JF003117/abstract, and “The Quiet Sinking of the World’s Deltas,” http://www.futureearth.org/blog/2014-apr-4/quiet-sinking-worlds-deltas.

89 acres of agricultural land: Andrew T. Guzman, *Overheated: The Human Cost of Climate Change* (Oxford: Oxford University Press, 2013), 156.

89 chain, may disappear: P. S. Roy, “Human Dimensions of Climate Change: Geospatial Perspective,” in *Climate Change, Biodiversity, and Food Security in the South Asian Region*, ed. Neelima Jerath et al. (New Delhi: Macmillan, 2010), 18–40, 32.

89 75 million in Bangladesh: Pradosh Kishan Nath, “Impact of Climate Change on Indian Economy: A Critical Review,” in *Climate Change: An Asian Perspective*, ed. Surjit Singh et al., 78–105, 91. For more on environmental refugees, see also Fred Pearce, *When the Rivers Run Dry: Water—The Defining Crisis of the Twentieth Century* (Boston: Beacon Press, 2006), Kindle edition, chap. 4.

89 will be displaced: Carlyle A. Thayer, “Vietnam,” in *Climate Change and National Security: A Country-Level Analysis*, ed. Daniel Moran (Washington, DC: Georgetown University Press, 2011) 29–41, 30.

89 turning into desert: Lester R. Brown, *World on the Edge: How to Prevent Environmental and Economic Collapse* (New York: W. W. Norton, 2011), 40.

89 supply by a quarter: Gwynne Dyer, *Climate Wars*, loc. 987.

89 “only meager crops”: Fred Pearce, *When the Rivers Run Dry*, loc. 356.

89 losses of $65 billion: Joanna I. Lewis, “China,” in *Climate Change and National Security: A Country Level Analysis*, ed. Daniel Moran (Washington, DC: Georgetown University Press), 9–26, 13–14.

See also Kenneth Pomeranz, *Water, Energy, and Politics: Chinese Industrial Revolutions in Global Environmental Perspective* (New York: Bloomsbury, forthcoming), 5.

90 "human race come together": Kenneth Pomeranz, "The Great Himalayan Watershed: Water Shortages, Mega-Projects, and Environmental Politics in China, India, and Southeast Asia," *Revue d'histoire modern et contemporaine* 62, no. 1 (January–March, 2015): 1, 6–47. I am grateful to the author for letting me have an English-language version of this article, published in shorter form in *New Left Review* 58 (2009) and elsewhere.

90 disappear by 2050: Kenneth Pomeranz, "The Great Himalayan Watershed," 32.

90 Indus floods of 2010: Varsha Joshi, "Climate Change in South Asia: Gender and Health Concerns," 209–26, 215, and Pradosh Kishan Nath, "Impact of Climate Change on Indian Economy: A Critical Review," 78–105, 88, both in *Climate Change: An Asian Perspective*, ed. Surjit Singh et al. See also Dewan Abdul Quadir et al., "Climate Change and Its Impacts on Bangladesh Floods over the Past Decades," and Anwar Ali, "Climate Change Impacts and Adaption Assessment in Bangladesh," 165–77, 169, both in *Proceedings of the SAARC Seminar on Climate Variability in the South Asian Region and its Impacts* (Dhaka: SAARC Meteorological Research Centre, 2003). And Wen Stephenson, *What We're Fighting for "Now" Is Each Other: Dispatches from the Front Lines of Climate Justice* (Boston: Beacon Press, 2015), Kindle edition, loc. 391.

90 of them are in Asia: Cf. Johan Rockström et al., "Planetary Boundaries: Exploring the Safe Operating Space for Humanity," *Ecology and Society* 14, no. 2 (2009): 32.

90 disproportionately by women: Surjit Singh, "Mainstreaming Gender in Climate Change Discourse," in *Climate Change: An Asian Perspective*, ed. Surjit Singh et al., 180–208, 184.

90 214 million people: Kenneth Pomeranz, "The Great Himalayan Watershed," 6–47, 7.

91 late in the twentieth century: Thus, as of 2015, the per capita carbon dioxide emissions of the United States and Germany, measured in metric tons, was 17.6 and 9.1, respectively, while the same figures for

China and India were 6.2 and 1.7, respectively. See "World Bank: CO2 Emissions (Metric Tons Per Capita)," http://data.worldbank.org/indicator/EN.ATM.CO2E.PC/countries.

91 back to the 1930s: Spencer R. Weart, *The Discovery of Global Warming* (Cambridge, MA: Harvard University Press, 2003), 1–2.

91 Mauna Loa Observatory in Hawaii: Charles D. Keeling, "Rewards and Penalties of Monitoring the Earth," *Annual Review of Energy and the Environment* 23 (1998): 25–82, 39–42.

92 in the late 1980s: Cf. "The History of Carbon Dioxide Emissions," http://www.wri.org/blog/2014/05/history-carbon-dioxide-emissions. The Four Tigers were South Korea, Taiwan, Hong Kong, and Singapore (John L. Brooke, *Climate Change and the Course of Global History*, 536). They were soon to be followed by the Southeast Asian economies.

92 asphyxiate in the process: Paul G. Harris notes, "If everyone were to live like Americans, the world would require ten times the energy it is using today." See Paul G. Harris, *What's Wrong with Climate Politics and How to Fix It* (Cambridge: Polity Press, 2013), 109.

93 to much of the world: Thus, for example, vulcanologist Bill McGuire cites 1769 CE as a key date in the history of the Anthropocene because that was the year when Richard Arkwright invented the spinning jenny, a machine that would serve as a critical link in the transition to carbon-intensive forms of production: "Arkwright's legacy," writes McGuire, "is nothing less than the industrialization of the world." See Bill McGuire, *Waking the Giant*, Kindle edition, loc. 363. For Timothy Morton, on the other hand, the key moment is April 1784, a date about which, he asserts, "we can be uncannily precise" because that was when James Watt "patented the steam engine." See Timothy Morton, *Hyperobjects*, loc. 210.

93 "particularly in the U.S.": Anil Agarwal and Sunita Narain, *Global Warming in an Unequal World: A Case of Environmental Colonialism* (New Delhi: Centre for Science and Environment, 1991), 1.

94 removed from each other: These connections and processes are explored at length by Jack Goody in *The Eurasian Miracle* (Cambridge: Polity Press, 2010).

94 and the Indian subcontinent: Sheldon Pollock, *The Language of the*

Gods in the World of Men: Sanskrit, Culture, and Power in Premodern India (Berkeley: University of California Press, 2009) 437–52.

94 by the Islamic expansion: Ibid., 489–94.

94 across the Eurasian landmass: Cf. John L. Brooke, *Climate Change and the Course of Global History*, 413, 418.

94 parts of the planet: Cf. Geoffery Parker, *Global Crisis*, loc. 17565: "The return of a warmer climate [in the eighteenth century] had broken the 'fatal synergy'"; and particularly John L. Brooke, *Climate Change and the Course of Global History*, 413–67.

94 Middle East, and India: Cf. Richard M. Eaton and Philip S. Wagoner, "Warfare on the Deccan Plateau, 1450–1600: A Military Revolution in Early Modern India?" *Journal of World History* 25, no. 1 (March 2014): 5–50.

94 savants from elsewhere: Cf. Prasannan Parthasarathi, *Why Europe Grew Rich and Asia Did Not: Global Economic Divergence, 1600–1850* (Cambridge: Cambridge University, Press, 2011), 191, and Richard Grove, "The Transfer of Botanical Knowledge between Europe and Asia, 1498–1800," *Journal of the Japan-Netherlands Institute* 3 (1991): 160–76.

94 "250 years" . . . by Jesuits: George Gheverghese Joseph, *The Crest of the Peacock: Non-European Roots of Mathematics*, 3rd ed. (Princeton, NJ: Princeton University Press, 2011), 439.

95 "stored up in the East": Jonardon Ganeri, *Indian Logic: A Reader* (London: Routledge, 2001), 7.

95 "ten years after his death": Jonardon Ganeri, "Philosophical Modernities: Polycentricity and Early Modernity in India," *Royal Institute of Philosophy Supplement* 74 (2014): 75–94, 87.

95 "to Europe and back": Jonardon Ganeri, "Philosophical Modernities," 86.

95 rest of the world: Sanjay Subrahmanyam, "Hearing Voices: Vignettes of Early Modernity in South Asia, 1400–1750," *Daedalus* 127, no. 3 (1998): 75–104.

95 its own uniqueness: For more on this, see Jack Goody, *The Theft of History* (Cambridge: Cambridge University Pres, 2006).

96 "medieval economic revolution": This episode may itself have had a complex relationship with climatic variations. Cf. Mark Elvin,

The Retreat of the Elephants: An Environmental History of China (New Haven, CT: Yale University Press, 2004) 6, 56.

96 Yellow, and Yangtze Rivers: Ibid., 23.

97 off to visit it: Quoted in ibid., 20–21.

97 easily accessible locations: Kenneth Pomeranz, *The Great Divergence: China, Europe, and the Making of the Modern World Economy* (Princeton, NJ: Princeton University Press, 2000), 46.

98 no cause for astonishment: Quoted by Mark Elvin, *The Retreat of the Elephants*, 68–69.

98 "vigor and virtuosity": Ibid., 69.

100 upon its surface: Amitav Ghosh, *The Glass Palace* (New Delhi: Penguin India, 2000), 130–31.

100 a millennium or more: Marilyn V. Longmuir, *Oil in Burma: The Extraction of "Earth-Oil" to 1914* (Banglamung, Thailand: White Lotus Press, 2001). I am grateful to Dr. Rupert Arrowsmith for bringing Longmuir's book to my notice. See also Khin Maung Gyi, *Memoirs of the Oil Industry in Burma, 905 A.D.–1980 A.D.* (1989).

100 "largest in the world": Marilyn V. Longmuir, *Oil in Burma*, 8.

101 "along the bank": Quoted in ibid., 9–10.

101 by the Burmese: Ibid., 24.

101 forty-six thousand barrels: Ibid., 46.

102 120 oil wells: Thant Myint-U, *The Making of Modern Burma* (Cambridge: Cambridge University Press, 2001), 181.

102 France and England: Ibid., 112–15.

102 1850s onward: Ibid., 149.

103 "Titusville, Pennsylvania": Marilyn V. Longmuir, *Oil in Burma*, 7.

103 Hudson River in 1807: Cf. Blair B. Kling, *Partner in Empire: Dwarkanath Tagore and the Age of Enterprise in Eastern India* (Berkeley: University of California Press, 1977), 65. According to Kling, the first steam engine to reach India was sent from Birmingham to Calcutta in 1817 or 1818; it was bought by the governing authority.

104 after the Netherlands: Parthasarathi, *Why Europe Grew Rich and Asia Did Not*, 229.

104 "flotilla in service": Henry T. Bernstein, *Steamboats on the Ganges* (Calcutta: Orient Longmans, 1960), quoted in Saroj Ghose, "Technology: What Is It?," in *Science, Technology, Imperialism, and*

War, ed. Jyoti Bhusan Das Gupta (New Delhi: Pearson, 2007), 197–260, 233.

104 forty-three thousand pounds sterling: Arnold van Beverhoudt, *These Are the Voyages: A History of Ships, Aircraft, and Spacecraft Named Enterprise* (self-published, 1990), 52.

104 nature of the journey: Ibid.

105 soot and cinders: Amitav Ghosh, *Flood of Fire* (New York: Farrar, Straus and Giroux).

105 commercial infrastructure: Blair B. Kling, *Partner in Empire*, 61.

106 coal in Bengal: Prasannan Parthasarathi, *Why Europe Grew Rich and Asia Did Not*, 231.

106 and the United States: Ibid., 233.

106 accessing British ports: R. A. Wadia, *The Bombay Dockyard and the Wadia Master Builders* (Bombay, 1955), 126–27, quoted in Saroj Ghose, "Technology: What Is It?," 225.

106 ships and sailors ("lascars"): See Prasannan Parthasarathi, *Why Europe Grew Rich and Asia Did Not*, 211.

106 "years put together": Satpal Sangwan, "The Sinking Ships: Colonial Policy and the Decline of Indian Shipping, 1735–1835," in *Technology and the Raj: Western Technology and Technical Transfers to India, 1700–1947*, ed. Rory MacLeod and Deepak Kumar (New Delhi, 1995), 137–52, quoted by Saroj Ghose, "Technology: What Is It?," 225.

107 "my own building": Quoted by Anne Bulley in *The Bombay Country Ships, 1790–1833* (Richmond: Curzon Press, 2000), 246.

107 "not being imitated": Timothy Mitchell, *Carbon Democracy*, loc. 404.

108 competitors elsewhere: See Prasannan Parthasarathi, *Why Europe Grew Rich and Asia Did Not*, 225 and 244: "The absence of state support for industrial development in India stands in stark contrast to the policies found in Europe in the eighteenth and nineteenth centuries."

109 critical to its advancement: Cf. ibid., 258–63.

109 "European imperial powers": Dipesh Chakrabarty, "Climate and Capital: On Conjoined Histories," *Critical Inquiry* 41 (Autumn 2014): 15.

111 "inevitable doom": David Archer, *The Long Thaw: How Humans Are Changing the Next 100,000 Years of Earth's Climate* (Princeton, NJ: Princeton University Press, 2009), 172.

111 "bare like locusts": *Young India*, December 20, 1928, 422.

112 "insatiable desires": I owe this reference to Liang Yongjia, Prasenjit Duara, and Tansen Sen; my thanks to all of them for their help.

113 "and nation-building": Prasenjit Duara, *The Crisis of Global Modernity: Asian Traditions and a Sustainable Future* (Cambridge: Cambridge University Press, 2015), 236.

113 wasteful of resources: Cf. Kaoru Sugihara, "East Asian Path," *Economic and Political Weekly* 39, no. 34 (2004): 3855–58.

113 "the Japanese people": Julia Adeney Thomas, "The Japanese Critique of History's Suppression of Nature," *Historical Consciousness, Historiography and Modern Japanese Values*, International Symposium in North America, International Research Center for Japanese Studies, Kyoto, Japan, 2002, 234; my italics.

113 "collapsed around them": Cf. A. Walter Dorn, "U Thant: Buddhism in Action," in *The UN Secretary-General and Moral Authority: Ethics and Religion in International Leadership*, ed. Kent J. Kille (Washington, DC: Georgetown University Press, 2007), 143–86. This article is also available as a pdf at http://walterdorn.net/pdf/UThant-BuddhismInAction_Dorn_SG-MoralAuthority_2007.pdf.

115 beings as a species: Dipesh Chakrabarty, "The Human Condition in the Anthropocene," The Tanner Lectures on Human Values, Yale University, 2015.

115 "of the present": Watsuji Tetsuro, *A Climate: A Philosophical Study*, tr. Geoffrey Bownas (Ministry of Education, Printing Bureau, Japanese Government, 1961), 30. I am grateful to Giorgio Agamben for bringing this work to my attention.

PART III

119 "or human-made systems": Dipesh Chakrabarty, "The Climate of History: Four Theses," *Critical Inquiry* 35 (Winter 2009): 208.

119 through human agency: Cf. Julia Adeney Thomas, "The Present Climate of Economics and History," in *Economic Development and Environmental History in the Anthropocene: Perspectives on Asia and Africa*, ed. Gareth Austin (London: Bloomsbury Academic, forthcoming), 4.

120 favored by the USSR: Cf. Frances Stonor Saunders, "Modern Art Was CIA 'Weapon,'" *The Independent*, October 21, 1995. See also Joel Whitney, *FINKS: How the CIA Tricked the World's Best Writers*, (London: OR Books, 2016), chap. 2.

120 "and the artist": Roger Shattuck, *The Banquet Years: The Origins of the Avant-Garde in France, 1885 to World War I* (New York: Vintage, 1968), 326.

120 passion for dams: Cf. Kenneth Pomeranz, "The Great Himalayan Watershed: Water Shortages, Mega-Projects, and Environmental Politics in China, India, and Southeast Asia," 19 (published in French as "Les eaux de l'Himalaya: Barrages géants et risques environnementaux en Asia contemporaine," in *Revue d'histoire modern et contemporaine* 62, no. 1 [January–March 2015]: 6–47); for Mao's "War against Nature," see Judith Shapiro, *Mao's War against Nature: Politics and the Environment in Revolutionary China* (Cambridge: Cambridge University Press, 2001).

120 "world [they] depict": Franco Moretti, *The Bourgeois*, 89.

121 "the official order": Arran E. Gare, *Postmodernism and the Environmental Crisis* (London: Routledge, 1995), 16.

121 perspective of the Anthropocene: As Stephanie LeMenager points out, even Upton Sinclair, a committed socialist and "one of the most ideologically driven American novelists," ends up romanticizing the gasoline-powered culture of cars. See Stephanie LeMenager, *Living Oil*, 69.

121 "becomes a commodity": Guy Debord, *The Society of the Spectacle*, 3rd ed. (New York: Zone Books, 1994), 59.

123 "with us always": Roger Shattuck, *The Banquet Years*, 25.

123 predecessor obsolete: Bruno Latour, *We Have Never Been Modern*, loc. 1412.

123 "wrong side of history": http://www.slate.com/blogs/lexicon_valley/2014/04/17/the_phrase_the_wrong_side_of_history_around_for_more_than_a_century_is_getting.html.

126 vulnerable to climate change: Cf. *IPCC's Fifth Assessment Report: What's in It for South Asia, Executive Summary* (available at: http://cdkn.org/wp-content/uploads/2014/04/CDKN-IPCC-Whats-in-it-for-South-Asia-AR5.pdf).

127 implicit in it: Friedrich Nietzsche, *On the Genealogy of Morals* (1887), tr. Carol Diethe, ed. Keith Ansell-Pearson (Cambridge: Cambridge University Press, 2006).

127 journey of self-discovery: "This emphasis on individual conscience and its capacity to 'trump' all other arguments in fact seems to be a defining feature of much of what has passed for radical (i.e., revolutionary) politics in the United States since the 1960s. . . . There is a pervasive stress on what each and every individual feels and experiences as providing the ultimate standard of legitimacy, action, and definition of collective goals." See Adam B. Seligman, Robert P. Weller, Michael J. Puett, and Bennett Simon, *Ritual and Its Consequences: An Essay on the Limits of Sincerity* (New York: Oxford University Press, 2008), Kindle edition, loc. 1946.

128 "his own life": http://electricliterature.com/knausgaard-and-the-meaning-of-fiction-2/.

128 "Puritan religiosity": Adam B. Seligman et al., *Ritual and Its Consequences*, loc. 1526.

128 imagining of possibilities: I follow here the notion of the subjunctive that is employed by Adam Seligman and his coauthors in *Ritual and Its Consequences*.

129 "ice shelf broke up": The question "Where were you at 400 ppm?" is posed by Joshua P. Howe in "This Is Nature; This Is Un-Nature: Reading the Keeling Curve," *Environmental History* 20, no. 2 (2015): 286–93, 290.

130 "implement their demands": Ingolfur Blühdorn, "Sustaining the Unsustainable: Symbolic Politics and the Politics of Simulation, *Environmental Politics* 16, no. 2 (2007): 251–75, 264–65.

130 after the First World War: Timothy Mitchell, *Carbon Democracy*, loc. 2998.

130 "They only consume": Roy Scranton, *Learning to Die in the Anthropocene: Reflections on the End of a Civilization* (San Francisco: City Lights Books, 2015), Kindle edition, loc. 640.

131 "legislation and governance": Ibid.

131 "the modern world": Adam B. Seligman et al., *Ritual and Its Consequences*, loc. 171.

131 "mere representation": Guy Debord, *The Society of the Spectacle*, thesis 1.

131 "reestablishes its rule": Ibid, thesis 18; my italics.

132 "moral issue": Naomi Klein makes a powerful case for enframing climate change as a moral issue in her magisterial *This Changes Everything: Capitalism vs. the Climate* (New York: Knopf, 2014). See also the following interview with Michael Mann: http://paulharrisonline.blogspot.in/2015/07/michael-mann-on-climate-change.html.

133 opposite side: I am following here the use of the word *sincerity* in Adam B. Seligman et al., *Ritual and Its Consequences*.

133 acted upon: As Rachel Dyer notes, "all the stuff about changing the light-bulbs and driving less, although it is useful for raising consciousness and gives people some sense of control over their fate, is practically irrelevant to the outcome of this crisis." See Rachel Dyer, *Climate Wars*, loc. 118.

134 "at the same time!": John Maynard Keynes, *The End of Laissez-Faire* (1926).

134 parts of a whole: In the words of Naomi Oreskes and Eric Conway, this is a "quasi-religious faith, hence the label *market fundamentalism*" (*The Collapse of Western Civilization: A View from the Future* [New York: Columbia University Press, 2014], 37).

135 "wicked problem": In one definition "wicked problems are essentially unique, have no definitive formulation, and can be considered symptoms of yet other problems" (Mike Hulme, *Why We Disagree about Climate Change: Understanding Controversy, Inaction and Opportunity* [Cambridge: Cambridge University Press, 2009], 334).

136 last two centuries: This is how Tim Flannery puts it: "America and Australia were created on the frontier, and the citizens of both nations hold deep beliefs about the benefits of endless growth and expansion." See *The Weather Makers: How Man Is Changing the Climate and What It Means for Life on Earth* (New York: Atlantic Monthly Press, 2006), 237.

136 throughout the Anglosphere: That the phenomenon of climate denial has a special place within the Anglosphere is recognized

by many; see, for example, this conversation between George Monbiot and George Marshall: https://www.youtube.com/watch?v=0cCCanfgZ4A (at 29 min.). See also "The Strange Relationship between Global Warming Denial and . . . Speaking English," *Mother Jones*, http://www.motherjones.com/environment/2014/07/climate-denial-us-uk-australia-canada-english. The survey on which the article is based is available here: http://www.ipsosglobaltrends.com/environment.html. In most industrialized European countries, by contrast, there is very little denial, either at the popular or official levels: cf. Elizabeth Kolbert, "Pieter van Geel, the Dutch environment secretary, described the European outlook to me as follows: 'We cannot say, "Well, we have our wealth, based on the use of fossil fuels for the last three hundred years, and, now that your countries are growing, you may not grow at this rate, because we have a climate change problem."'" See chap. 8 of Kolbert's *Field Notes from a Catastrophe: Man, Nature, and Climate Change* (New York: Bloomsbury, 2006).

136 in the United States: Anthony Giddens notes, "In no other country is opinion about climate change so acutely divided as in the US today." See Giddens's *The Politics of Climate Change*, 2nd ed. (Cambridge: Polity Press, Cambridge, 2011), 89.

137 politics of self-definition: See Michael Shellenberger and Ted Norhaus, "The Death of Environmentalism": "Environmentalists are in a culture war whether we like it or not" (10). Similarly Andrew J. Hoffman, notes, "The debate over climate change in the United States (and elsewhere) is not about carbon dioxide and greenhouse gas models; it is about opposing cultural values and worldviews through which that science is seen" (*How Culture Shapes the Climate Change Debate* [Stanford, CA: Stanford University Press, 2015], Kindle edition, loc. 139).

137 to be American: Raymond S. Bradley, *Global Warming and Political Intimidation: How Politicians Cracked Down on Scientists as the Earth Heated Up* (Boston: University of Massachusetts Press, 2011), 128.

137 communism, and so on: Cf. George Marshall, *Don't Even Think about It*, 37: "As Rush Limbaugh says, climate science 'has become a home for displaced socialists and communists.'"

137 the Cold War: Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury, 2010), 214.

137 intimidation: Michael Mann describes his battles with climate change deniers at length in his book *The Hockey Stick and the Climate Wars* (New York: Columbia University Press, 2012). See also Raymond S. Bradley, *Global Warming and Political Intimidation*, 125 and 145–48.

137 energy billionaires: Oreskes and Conway, *Merchants of Doubt*.

137 within the electorate: Elizabeth Kolbert in chap. 8 of *Field Notes from a Catastrophe* names some of the lobbying groups, such as the "Global Climate Coalition, a group that was sponsored by, among others, Chevron, Exxon, Ford, General Motors, Mobil, Shell, and Texaco." See also Tim Flannery, *The Weather Makers*, 239.

137 climate scientists: In any case, as Kevin Lister notes, "Even the most ardent papers on climate change such as the Guardian and Independent continue to devote far more space to advertising high carbon holidays abroad and reporting the most intricate details of Formula 1 than they do on reporting climate change" (*The Vortex of Violence and Why We Are Losing the Battle on Climate Change* [CreateSpace Independent Publishing Platform, 2014]), 21.

138 politics of the Anglosphere: "Denial" is not a major factor in most of the world, as Anthony Giddens notes in *The Politics of Climate Change*: "Surveys taken on a global level show that people in the developing countries are the most concerned about climate change. A cross-cultural study of nine developed and developing countries indicated that about 60 per cent of people interviewed about climate change in China, India, Mexico and Brazil felt a 'high level of concern.'" (104).

138 money and manipulation: For more on this, see Joshua P. Howe's review of Oreskes and Conway, *Merchants of Doubt*, in his article "The Stories We Tell," *Historical Studies in the Natural Sciences* 42, no. 3 (June 2012): 244–54, esp. 253.

139 "of the solution": George Marshall, *Don't Even Think about It*, 75–76. Gwynne Dyer in *Climate Wars* notes that the "US Army War College sponsored a two-day conference on 'The National Security

Implications of Climate Change' in 2007" (loc. 250).

139 "security environment": "Admiral Locklear: Climate Change the Biggest Long-Term Security Risk in the Pacific Region," http://climateandsecurity.org/2013/03/12/admiral-locklear-climate-change-the-biggest-long-term-security-threat-in-the-pacific-region/.

139 "Dept. of Defense": https://www.youtube.com/watch?v=ckjY-FW7-dc.

139 the public sphere: Sanjay Chaturvedi and Timothy Doyle, *Climate Terror: A Critical Geopolitics of Climate Change* (Basingstoke: Palgrave Macmillan, 2015), Kindle edition, locs. 3193–215.

139 "neo-securities are one": Ibid., loc. 3256.

140 climate change: See, for example, Kurt Campbell et al., "The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change" (Center for New American Security, 2007). Gwynne Dyer in *Climate Wars* notes of this study that "the lead authors . . . include John Podesta, who served as chief of staff to President Clinton in 1998–2000; Leon Fuerth, national security advisor to Vice President Gore . . . and R. James Woolsey, Jr., head of the Central Intelligence Agency 1993–95" (loc. 304).

140 "disobedience, and vandalism": Quoted in Roy Scranton, *Learning to Die in the Anthropocene*, loc. 80.

140 a top priority: The FBI, for instance, has named "animal rights extremists and eco-terrorism" as its "highest domestic terrorism priority." See Will Potter, *Green Is the New Red: An Insider's Account of a Social Movement under Siege* (San Francisco: City Lights Books, 2011), 25, 44.

140 post-9/11 era: Giorgio Agamben, *State of Exception*, tr. Kevin Attell (Chicago: University of Chicago Press, 2005), Kindle edition, loc. 40.

140 recent years: See Nafeez Ahmed, "Pentagon Bracing for Public Dissent Over Climate and Energy Shocks, *The Guardian*, June 14, 2013 (also available at http://www.theguardian.com/environment/earth-insight/2013/jun/14/climate-change-energy-shocks-nsa-prism).

140 many different kinds: Cf. Adam Federman, "We're Being Watched: How Corporations and Law Enforcement Are Spying on Environmentalists," *Earth Island Journal* (Summer 2013), also

available at http://www.earthisland.org/journal/index.php/eij/article/we_are_being_watched/. The term "gray intelligence" was coined by Dr. Bob Hoogenboom, a Dutch professor of Forensic Business Studies.

140 "and its impacts": Cf. "Be Prepared: Climate Change Security and Australia's Defense Force," Climate Council: http://www.climatecouncil.org.au/uploads/fa8b3c7d4c6477720434d6d10897af18.pdf.

141 approach to climate change: As Roy Scranton points out, "President Obama's 2010 *National Security Strategy*, the Pentagon's *2014 Quadrennial Defense Review*, and the Department of Homeland Security's *2014 Quadrennial Homeland Security Review*, all identify climate change as a severe and imminent danger" (*Learning to Die in the Anthropocene*, loc. 86.)

141 are most visible: Lewis R. Gordon, in *What Fanon Said: A Philosophical Introduction to His Life and Thought* (New York: Fordham University Press, 2015), writes, "In the colonies the truth was naked, the 'metropoles' preferred it clothed" (133).

141 of the metropole: "In the colonies the truth was naked, the 'metropoles' preferred it clothed." Cf. ibid.

142 "biopolitics": In Foucault's definition, biopolitics is the "attempt, starting from the eighteenth century, to rationalize the problems posed to governmental practice by phenomena characteristic of a set of living beings forming a population: health, hygiene, birthrate, life expectancy, race" (Michel Foucault, *The Birth of Biopolitics*, tr. Graham Burchell [New York: Picador, 2004], 317).

142 "would not exist": Timothy Mitchell, *Carbon Democracy*, loc. 136.

143 political legitimacy: Although some would argue, following John Rawls, that principles of justice "apply only to the internal affairs within nations and cannot be extended to apply either to relations between nations or among all the world's persons" (Steve Vanderheiden, *Atmospheric Justice: A Political Theory of Climate Change* [New York: Oxford University Press, 2008], 83).

143 "climate budget": Cf. Tom Athanasiou and Paul Baer, *Dead Heat: Global Justice and Global Warming* (New York: Seven Stories Press, 2002), 76–85.

143 "anti-immigrant policing": Christian Parenti, *Tropic of Chaos: Climate Change and the New Geography of Violence* (New York: Nation Books, 2012), 225.

143 "combat with the earth": Sanjay Chaturdevi and Timothy Doyle, *Climate Terror*, loc. 2893.

145 military space: Ibid., loc. 2984.

145 mitigatory measures: Thus George Monbiot writes (and I wish it were true): "there is a good political reason for fairness. People are more willing to act if they perceive that everyone else is acting" (*Heat: How to Stop the Planet from Burning* (Cambridge, MA: South End Press, 2007), 43).

146 "90 percent": David Archer, *The Long Thaw: How Humans Are Changing the Next 100,000 Years of Earth's Climate* (Princeton, NJ: Princeton University Press, 2009), 163.

147 accustomed to hardship: Something like this was actually implied by Larry Summers when, as head of the World Bank, he proposed that polluting industries should be relocated to less developed nations: "After all, those living in the Third World couldn't expect to live as long as 'we' do, so what could be wrong with reducing their lifetimes by a miniscule amount . . . ?" See David Palumbo-Liu, *The Deliverance of Others: Reading Literature in a Global Age* (Durham, NC: Duke University Press, 2012), vii–viii. Other economists have applied a similar logic. As George Monbiot points out in *Heat*: "In 1996, for example, a study for the Intergovernmental Panel on Climate Change estimated that a life lost in the poor nations could be priced at $150,00, while a life lost in the rich nations could be assessed at $ 1.5 million" (50).

147 "each food calorie": David Orr, *Down to the Wire*, 33.

148 "fifty-six thousand": James Lawrence Powell, *Rough Winds: Extreme Weather and Climate Change*, Kindle Single, 2011, locs. 212–37.

148 living in isolation: Ibid., loc. 210.

149 "those from the OECD": Cf. Samir Saran and Vivan Sharan, "Unbundling the Coal-Climate Equation," *The Hindu*, October 7, 2015.

149 climate change negotiations: As Clive Hamilton observes, the obsession with growth in developing countries is "perhaps the last

and most potent legacy of colonialism" (*Growth Fetish* [Crow's Nest: Allen & Unwin, 2003], Kindle edition, loc. 232).

150 "ramp of global warming": The phrase is Michael Mann's; cf. http://bigstory.ap.org/article/60abc049a4f14cc3bd2569eac806cbde/noaa-nasa-2015-was-hottest-earth-wide-margin.

150 appeared in December: The texts are, respectively, *Encyclical Letter* Laudato Si' *of the Holy Father Francis on Care of Our Common Home* (hereafter Encyclical), available at https://laudatosi.com/watch; and *Framework Convention on Climate Change* (hereafter Agreement), published by the United Nations and available at http://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf.

150 are also *texts*: The text of the Agreement is specified as having originally been written in English. No original language is specified in the case of the Encyclical nor is any translator listed, so it must be presumed that the text is at least partly the result of a collaboration.

153 already beyond reach: For an extended discussion of "dangerous limits" and public policy, see Christopher Shaw, *The Two Degree Dangerous Limit: Public Understanding and Decision Making* (London: Routledge, 2015).

153 succeed at scale: Cf. Kevin Anderson, *The Hidden Agenda: How Veiled Techno-Utopias Shore Up the Paris Agreement*, http://kevinanderson.info/blog/the-hidden-agenda-how-veiled-techno-utopias-shore-up-the-paris-agreement/. See also "COP21: Paris Deal Far Too Weak to Prevent Devastating Climate Change, Academics Warn," *The Independent*, January 8, 2016.

154 "experts in technology": Encyclical, 79/106.

154 "technological growth": Ibid., 82/109.

154 "drug addiction," and so on: See, for example, *United Nations Single Convention on Narcotic Drugs* (available at https://www.unodc.org/pdf/convention_1961_en.pdf), resolution 3.

154 "market imperfections": *Kyoto Protocol to the United Nations Framework Convention on Climate Change* (available at http://unfccc.int/resource/docs/convkp/kpeng.pdf), article 2 a/v.

154 "concern for humankind": Agreement, 20.

155 celestial needle: Very soon after the Agreement was reached,

twenty-one climate scientists published a open letter saying that the deal had succeeded only in kicking "the can down the road by committing to calculate a new carbon budget for a 1.5 deg C temperature increase that can be talked about in 2020." See "COP 21: Paris Deal Far Too Weak to Prevent Devastating Climate Change Academics Warn," *The Independent*, January 8, 2016.

155 "to be human": Encyclical, 10/11.

155 "highest level": Agreement, 17–18/articles 122 and 123.

156 "world's population": Encyclical, 35/50.

157 "interior peace": Ibid., 10/10.

157 "*cry of the poor*": Ibid., 35/49.

158 "global north and south": Ibid., 36/51.

158 "address climate change": Agreement, 20.

158 "liability or compensation": Ibid., 8/article 52.

159 "human abilities": Encyclical, 16/19.

159 "freedom is limitless": Ibid., 7/6.

159 "but also nature": Ibid., 8/7.

159 politics of climate change: See, for instance, "The Interfaith Declaration on Climate Change," http://www.interfaithdeclaration.org/.

159 voiced their concern: See "The Hindu Declaration on Climate Change," http://fore.yale.edu/news/item/hindu-declaration-on-climate-change/; "The Muslim 7-Year Action Plan to Deal with Climate Change," http://www.arcworld.org/downloads/Muslim-7YP.pdf; and "Global Buddhist Climate Change Collective," http://gbccc.org/who-we-are/.

159 on their own: Timothy Mitchell notes in *Carbon Democracy*, "existing forms of democratic government appear incapable of taking the precautions needed to protect the long-term future of the planet" (loc. 253).

159 group of people: Paul G. Harris addresses this problem at some length in the chapter entitled "The Cancer of Westphalia: Climate Diplomacy and the International System" in his book *What's Wrong with Climate Politics and How to Fix It* (Cambridge: Polity Press, 2013).

161 "from a body": Ruth Irwin, *Heidegger, Politics, and Climate Change: Risking It All* (New York: Bloomsbury, 2008), 158.