INTRODUCTION

A New History for a Young Century

Every history reflects the experiences of its age, and syntheses are particularly susceptible to the tides of the times. Among the experiences that have shaped this book, the most obvious is the bundle of processes commonly known as globalization. The need for planetary perspectives is probably beyond debate in an age where the world is more interconnected in more ways than ever before. It shows in a boom of scholarship on environmental issues in the Global South. Environmental historians have moved beyond their traditional mainstay in Western Europe and the United States, and regions such as Russia and the Middle East, which John McNeill described as "near black holes" of environmental history as recently as 2011, have gained more attention.[1] As result, today we are in a much better position to write environmental history in a global context. No longer does a synthesis need to start in Europe or North America because research on the rest of the world is simply too scarce.

Second, we have learned in recent decades that we should be gravely concerned about the state of our planet. We do not lack achievements

on specific issues and in certain places, but the overall trend in the interplay between humans and the natural environment is clearly negative: anthropogenic climate change, loss of biological diversity, pollution, resource woes—we know about the environmental toll of global modernity in greater detail and with more certainty than ever. We also know that these challenges will not be met in satisfactory fashion anytime soon, and they will not go away miraculously either. Only a fool would deny that environmental challenges will define the twenty-first century—and it should leave us unimpressed that the number of fools remains at disheartening levels.

Neither of these points is new. The severity of the environmental crisis and the interconnectedness of the globe have inspired environmental histories from the early 1970s to John McNeill's *Something New under the Sun* and Joachim Radkau's *Nature and Power*, the two magistral syntheses that greeted the new millennium for the purpose of environmental history. I am greatly indebted to this intellectual tradition, certainly more than the notes in this volume suggest, and yet this book departs from a third observation that marks a break with existing scholarship. The environmental challenges of the twenty-first century look different from the challenges that earlier generations of scholars were writing about.

Looking back at McNeill's and Radkau's books after two decades, it is odd to realize how these authors confidently structured their narratives along spatial and thematic lines. McNeill discussed the lithosphere and pedosphere, the atmosphere and the hydrosphere, with subchapters looking into forests, whaling, and so on, and Radkau gave much attention to nation-states from the United States to Bhutan.[2] However, global historians have become wary about the container theory of statehood, and the same holds true for biological spheres. Entanglements figure prominently in the recent literature: humans, ideas, commodities, and species traveled the world in all sorts of directions, and scholars have made the case that interconnections matter in many different ways.[3] Convenient compartmentalizations, be they geological, biological, or political in nature, look increasingly dubious in a global age.

These doubts were historiographic as well as political. When the world entered a new millennium, there was no way to deny that the agenda of environmentalism was a wild mix of issues: pollution, garbage, exhaustion of resources, protection of landscapes, endangered species, and so forth. The severity of problems also differed around the

globe. London smog was a thing of the past in the British capital by the 1970s while other industrial areas were still wrestling with coal smoke, and particulates remain one of the world's major killers. Or maybe the real problem about London smog was the use of fossil fuels. It also became clear that responses to environmental problems had repercussions in other realms. Numerous nature reserves, dearly needed to preserve biological diversity, went at the expense of Indigenous populations. And what about environmental solutions that created new problems, such as when sewage treatment led to an accumulation of toxic sludge? Despite plenty of expertise, environmental challenges defy big comprehensive blueprints—as seen in 2020, when the fiftieth anniversary of the first Earth Day coincided with the global spread of COVID-19.

Except for a lunatic fringe, everyone knows about the environmental toll of industrial civilization today. What is recognized less often is the growing uncertainty on how to approach this toll. Priorities, approaches, institutions, even the definition of problems—once upon a time, we thought that we had clear ideas and settled routines on all these things, but received wisdoms have come into doubt. Global environmentalism is not like a Beethoven symphony, where you know after the first few measures what is coming. It is more akin to an orchestra with many instruments and even more pieces of music, and more often than not, the sound that prevails is not so much due to a heroic conductor as to the powerful lungs of some of the players. We live in an interconnected world, and we can no longer define priorities and externalities in the traditional manner, simply as givens. Priorities are matters of perspectives, and what qualifies as an externality for some may be someone else's life.

In a global twenty-first century, we can no longer write environmental history with a predefined set of concepts and a fixed hierarchy of issues. Agents, nation-states, tools, the political and cultural framing of issues—categories that were self-evident a generation ago—have become blurry and contested. Some authors, notably those under the influence of the Anthropocene thesis, have tried to cut through these ambiguities and imposed categories by force, borrowing on the presumably ironclad findings from the natural sciences, but this suggests a global consensus on environmental matters that does not exist: there is no Archimedian point in today's world. In fact, it has dawned on us that the idea of a global consensus has always been more fiction than reality, the result of a Western intellectual hegemony that looks irre-

trievably gone. In our age of globalization, an environmental history of the modern world needs to view the past from the perspectives of the industrialized West and the Global South, the policymaker and the consumer, the expert and the layperson, the urbanite and the farmer, and so on.

At first glance, this approach might smack of relativism, but it actually comes down to the exact opposite. Environmental historians have long made the point that we face limits in our interaction with the natural environment, but these limits are not just material and ecological: they are also about institutions, about laws and government bodies, about mindsets and interests, about technologies and expertise, and they are about the shadow of history. As humans have engaged with environmental challenges over time, they have accumulated a legacy that this book seeks to dissect. Materialities and technologies, laws and experts, institutions and cultural tropes—many things frame our engagement with the nonhuman world, and we can only understand them as products of a long and complicated history. Once we start to untangle this history and take stock of our environmental legacy in its full complexity, it becomes clear that there is no room on our planet for an environmental "anything goes." In an interconnected age, where past experiences are entrenched in technologies, materialities, institutions, cultural tropes and ecological conditions, very few things "go."

While this book seeks to complicate environmental history in some respects, it also aims to make it more transparent in others. A global scope can bring out something that is typically lost in case studies on specific times and places: environmental challenges are remarkably similar in otherwise different parts of the world. The laws of nature hold force everywhere, and this makes for a baseline of similarities that this book seeks to tease out. In other words, environmental history provides an opportunity to make world history *simpler*—completely unlike cultural or political history, where going global quickly leads to a cataclysm of complications. Invasive species, pests, dams, sewers, and other phenomena have triggered similar responses around the globe, and if we compare individual trajectories, we can map recurring paths in the human engagement with environmental challenges. In fact, similarities are so strong that one can understand global challenges by departing from a single example—assuming, of course, that this example is chosen judiciously.

The conclusion will take it from here and summarize the stories in

this book as individual threads in a global entanglement of five big trends: the Great Need, the Great Externalization, the Great Reckoning, the Great Regulation, and the Great Narrowing. This introduction seeks to outline the methodological essentials of this endeavor, and the most basic is about what this synthesis aims to achieve. The book seeks to map the environmental trajectory of the modern world and analyzes the environmentalisms of our time as products of history, but it refuses to deliver the classic synthetic overview. More specifically, this volume does not offer the kind of intellectual order that syntheses typically do, and it is not about indecisiveness on the part of the author: it is what the state of the planet demands. While writing was under way, a German professor inquired, "Wie das alles zusammenkommt"—how does it all come together? There was a simple answer to that question: it does not come together at all, and that is precisely the point. The chapters in this book end with open questions, moral dilemmas, or a realization that solutions merely bought time, and I will not hand out solutions ex cathedra. We do not live in a world where things simply add up: where we are accumulating wisdoms, technologies and solutions and are getting better all the time. If things do not make intuitive sense, if moral and practical inconsistencies linger, and if we are stuck with unsatisfactory or paradoxical outcomes, that is just where we are. This book is a world history for an age where things seem to fall apart—where we see what is coming, where we have the tools, technological ones and others, and plenty of experience, and yet somehow fail to get our act together.

In other words, this world history seeks to turn complication into an object of study. Every chapter moves up to the present and traces material, technological, institutional, and cultural developments along with the making of ambiguities and fault lines. Complication was made in concrete places, by real people driven by interests, mindsets and experiences, in ways that are open to scrutiny: we can arrive at a much more sophisticated understanding of our own predicament, the material, political, and intellectual mess that we are wrestling with, if we view it as a product of history. Challenges and responses coevolved over time, and they were shaped by vested interests, artifacts, power relations, institutions, and cultural tropes. We can arrrive at a better understanding of our concepts, our definitions of problems, our priorities, and our taboos if we take a closer look at how we came to them.

This approach has consequences that go down to the basics of his-

tory writing. There is no way to tell this history in traditional linear fashion: we need a nonlinear, entangled mode of historical narration that does not reproduce the intellectual hierarchies of the Western world but rather exposes them to scrutiny while being scholarly rigorous, reasonably specific, and sufficiently precise. Nonlinear narratives need a combination of top-down and bottom-up perspectives, and I hope to convince readers that this is best achieved by departing from one exemplary case. In order to bind the individual narrative threads together, this project needs a conceptual metaphor that highlights the interconnectedness and the dynamism of the modern world, and the vortex is the best metaphor that I could think of. But first of all, this world history departs from the realization that the environment, obviously the most basic category of any environmental history, is not just a given: it has a history that matters, like everything else. We need a new history in order to write narratives that make sense in a global twenty-first century, but this history is not without precedent. In some respects, this book argues for a return to an environmental history that we once had.

THE FLOW OF HISTORY

As concepts go, the environment is one of the younger ones. According to Paul Warde, Libby Robin, and Sverker Sörlin, it was a product of the postwar years, when hopes for the future and fears about humanity's destructive potential mixed in a way that made for an intellectual watershed of the first order. The environment was global, it was all around us, and it was under threat, and the details of the diagnosis were evolving within these general parameters.[4] Most people treat the environment as a self-evident concept today, and the word serves to define ambitions, policies, and academic disciplines, including a historical one. However, the environment was not invented out of the blue, and neither was environmental history. Historiographic surveys typically focus on the upswing of research since the 1970s, but there was such a thing as an environmental history avant la lettre, though not in the sense of a self-conscious academic field. It was merely a hodgepodge of scholars and books, held together not so much by a moral cause as by a realization that the nonhuman world mattered somehow, but it can be inspiring to read books from the time before the environment became a paradigmatic concept. It serves to challenge conventional wisdoms about the place of nature in human history, and it brings out the hidden assumptions in our modes of historical narration. After 1945,

the environment was first and foremost a bundle of problems, but one could also see it as the inevitable base of all human life.

Warde and his coauthors did not mention Fernand Braudel and his expansive *La Méditerranée*. Mostly written during his time as a prisoner of war in Nazi Germany, it discusses the Mediterranean world in the age of Philip II with great attention to the natural environment. Braudel famously opened his lengthy treatise—the original edition contained some 600,000 words, which is double the size of this book—with remarks on the different speeds of history. He distinguished three fields, each with a rhythm of its own.[5] In his opinion, the fastest but also the most superficial one was *l'histoire événementielle*: he emphatically confined the history of events to "surface disturbances, crests of foam that the tides of history carry on their strong backs." The second field was about societies and economies, "the history of groups and grouping," where change took place at a more measured pace. Finally, there was "a history whose passage is almost imperceptible" and where change was about "constant repetition, ever-recurring cycles." This history was about the natural environment.[6]

On first glance, Braudel's *La Méditerranée* seems of limited value for a study of modern history. His argument about cyclical change probably worked for the sixteenth-century world, but it is a far cry from our modern predicament, where acceleration and accumulation of harm seem to be the norm. While natural environments are typically vulnerable and under threat in modern history, they seem rather static in Braudel's narrative—though he did note in prescient manner that "everything changes, even the climate."[7] For the most part, Braudel discusses how the natural environment created challenges for humans, not the other way round. Against this background, it might seem that the only benefit of invoking Braudel for the present endeavor is that he provides an excuse for writing a really big book.

However, three points deserve closer scrutiny. The first concerns Braudel's broad understanding of the environment. He talked about natural conditions, but he also covered transhumance and nomadism, agriculture in the mountains and in the plains, droughts and famines, shipping and urban life, epidemics and the seasons. There were plenty of problems in Braudel's environment, but problems were not what defined the natural world: it was the setting where people tried to make a living. It was something to work with, a realm that was entangled with humans on so many levels that the entire distinction between humans and the environment became dubious: "Human life responds to the

commands of the environment, but also seeks to evade and overcome them, only to be caught in other toils."[8] For Braudel, the environment was not in trouble. It was just there.

Second, Braudel's narrative showed how natural environments created baselines of similarities. He was certainly not oblivious of the diversity of his geographic realm. He devoted individual sections to the Tyrrhenian Sea, the Adriatic and other parts of the Mediterranean, and he looked extensively at the Sahara, Europe, and the Atlantic Ocean as well. But he did not leave it at a mere account of peculiar geographies. He looked at famines and how cities reacted by creating grain storages and regulating food markets. In his remarks on epidemics, he identified general urban patterns such as "using disinfectants based on aromatic herbs, destroying by fire the belongings of plague victims, enforcing quarantine on persons and goods . . . , recruiting doctors, introducing health certificates"—though Braudel did not fail to note that notwithstanding all these efforts, "the rich had always sought their salvation in flight."[9] Some of these responses will resurface in the cholera chapter.

Third, Braudel was onto something when he couched his concept in hydrological terms. A watery metaphor was probably no coincidence for a scholar who pursued a vision of "total history." A pool of water is indeed total for those who are floating in it, and water in motion has a fearsome dynamism that can dwarf human agency. Braudel's waves of history were massive, they crushed humans and exposed them to the elements, and the natural environment has not lost its ruthlessness since the sixteenth century. We now have better technology and better knowledge about many pertinent challenges, but the nonhuman world is still beyond our control. It is just that waves are a rather poor metaphor for the flow of history in modern times.

The natural world continues to operate in cycles, but humans have created new material flows that are more unidirectional. Huge resource streams flow into the urban centers of the modern world, and equally huge streams of waste emanate from them. Global trade networks channel billions of tons of oil each year, with many millions of tons of everything from wheat to oranges to boot, and the pollutants that they produce have changed the global climate, among other things. In fact, the human footprint has grown to such an extent that scientists talk about a new geological epoch, the Anthropocene, where humans stand on a par with the forces of nature.[10] The modern world has an unprecedented hunger for stuff, and it has an equally unprecedented

ability to put other stuff into motion, but movement no longer comes in the form of waves. It is not a deluge either, though it is devastating beyond measure. A deluge peters out after a while, and it comes mostly from a single direction, but neither is the case in our time. In the modern era, wanted and unwanted flows have increased relentlessly, they are the cumulative product of many individual streams, and there is plenty of turbulence.

In light of these features, it seems more appropriate to view the flow of history in the modern era as a giant vortex. The emphasis is on the singular: we cannot understand global flows if we study them one by one. They have mixed and interacted in an eminently haphazard manner, and that has created plenty of crosscurrents and secondary and tertiary vortices. The vortex also features a lot of intended and accidental obstacles that shape the flow in one way or another. There is a lot of movement inside a vortex, there are moments of calm, and it can be smooth sailing for a while, but there is ultimately no escape from the material heft of masses in motion. A vortex is about dynamism and momentum, and it is about humans who tend to underestimate the forces that they are wrestling with. A vortex can look harmless, and it can be fun to drift along in the outer fringes. But when you move toward the core, things are getting serious.

VORTEXIAN HISTORY

As understood in this book, the vortex is a metaphor, and it should be read accordingly. The masses that humans have set into motion are terrifying, but weight is ultimately just one of numerous properties that the nonhuman players on the stage of history can claim. Momentum serves as a descriptor for forces of nature that are just there, whether humans like it or not. It can be about toxicity, or an awkward smell or taste, or the ability of a plant, animal, or pathogen to multiply rapidly, or something else. The key is that the vortex highlights the powers of the nonhuman world and their unrelenting inclination to push humans around.

As with every conceptual metaphor, the case for the vortex rests on analytical merits. The vortex evokes a sense of dynamism and forces beyond control, particularly if we think of it on a planetary scale. The metaphor also evokes a sense of turbulence and chaos. There are rough waters inside a vortex, and while some people may profit from beneficial currents, they should never be too confident about their good fortune. Humans are at the mercy of the elements inside a vortex, but

they are not passive victims. They can navigate the water, they can create barriers or channel flows to their advantage, but it takes time, energy, knowledge, and a decent understanding of human means.

The vortex is about the power of the nonhuman world, but the metaphor is ultimately anthropocentric. It would be a mere feature of the natural world, perhaps equivalent in significance to the Great Red Spot on Jupiter, if it were not for its frightening ability to harm and swallow humans. At the risk of stating the obvious, the vortex is also a product of human inputs, particularly the voracious hunger for huge amounts of stuff that runs through modern history. At the same time, modern history includes plenty of efforts to tame, control, or even stop the flow, and assessing these efforts is a major part of the following text. In short, the vortex is not a raw force of nature. It is a highly regulated endeavor, albeit in an uncoordinated, if not chaotic fashion. There is no control center (though the dream of building one remains alive), but regulations matter even if they ultimately come down to a patchwork.

Regulations can take many forms: law, codes of practice, policies enacted by states or corporations, expert knowledge, cultural tropes. The vortex metaphor suggests a tepid primacy of the material, but it is a soft determinism, if it is a determinism at all. Scholars have played parlor games between environmental determinism and cultural relativism, but that is a type of academic ping-pong that has outgrown its usefulness, if it had any at all: many pertinent discussions bore all the marks of academic turf wars. In this volume, the guiding question is not whether institutions are more significant than cultural tropes or technologies, material properties, or ecological interactions—the focus is on how they mattered in specific contexts. Sometimes a book made history, as in the case of Rachel Carson's volume vis-à-vis the insecticide DDT. Sometimes it was a technology with "killer app" quality, such as the slaughterhouses of Chicago. And sometimes institutions win out, as in the case of the land title—one of the most successful inventions of Western modernity, still on a victory run in spite of a broad array of problems.

Many flows have clashed and converged, and it was the same with human responses to these flows. Institutions interlocked, and so did cultural tropes, business practices, materialities, and so forth. These interactions are a defining issue in this book, and they follow no discernible pattern: the web of interlinkages has grown over time and continues to grow, and we can only understand it as a product of his-

tory. Cross-references highlight these interconnections in the following narrative, and readers are encouraged to follow them even if it has an erratic feel. Doing so provides an idea of the fragmentary nature of the project of modernity.

It is important to recognize that these entanglements are stabilizing and constraining in equal measure, and hence a bit different from the entanglements that global historians have frequently recorded with a sense of enthusiasm. In an age of globalization, it is tempting to view entanglements as a mind-broadening force, and scholars have produced ample evidence that this is the case for cultural entanglements. Six decades ago, William H. McNeill wrote *The Rise of the West*, a sweeping overview of human history where civilizations thrived on interactions, and that was long before postmodernism celebrated exuberant possibilities.[11] But more often than not, environmental entanglements, and particularly those that include technologies and materialities, end up *constraining* the range of options. If several trends overlap in the human engagement with environmental challenges, people may come to a point where few options remain. It can happen with amazing speed. In the case of COVID-19, it took just a few weeks to get governments to a point where the only remaining choice was about which kind of lockdown they should enact.

The vortex can be brutal, but it is also hard to figure out. Currents are diverse, turbulences are hard to predict, and that is not the least among the attractions of this conceptual metaphor. A vortex features resilience as well as fragility, and one should never be too certain about what will prevail. After all, a multitude of rationales were in play in the modern world, from food systems to transport routines and modes of waste removal, and the general trend of the modern world is ultimately a composite product of these different rationales. The world is not a bathtub, where events are predictable until everything has gone down the drain. As understood in this book, the vortex is out at sea where things are constantly in flux, where a broad range of actors navigate more or less at will, where the seabed is diverse and widely unknown, and where a big wave can make a difference.

Water lacks buffer quality, and this means that movements can resonate in unexpected places. And yet interactions may surprise those schooled in the first law of ecology, which suggests, in the words of Barry Commoner, that "everything is connected to everything else."[12] The following narrative suggests an important addendum: some interconnections matter far more than others. The following stories feature

a multitude of rationales and a range of entanglements, but neither is unlimited in numbers. As this book will show, it is possible to highlight the crucial rationales and the critical interconnections in any given field on a few dozen pages—with the notable exception of climate change.[13] It is not the sheer number of interconnections that make for the tensions and dilemmas that lie at the heart of the present discussion. It is that rationales and interconnections operate with different degrees of autonomy and force. Some things are tightly connected to some other things, but other connections are loose or insignificant in the grand scheme of things. The web of modern life is not a network of countless atomized entities with an infinite number of linkages. It is more akin to a set of tightly interwoven clusters: food chains, energy systems, expert communities, and so forth. Each of these clusters has an iron pulse of its own, and there is no guarantee whatsoever that they work in sync.

Most people associate a vortex with the threat of drowning, and a pessimistic undertone may not be entirely inappropriate for an environmental history of the modern world. In the twenty-first century, few people are confident that humanity's engagement with the natural environment is bound for a happy ending. But drowning is no foregone conclusion in a vortex, and a bird's-eye view is only one of numerous perspectives on a vortex. Much of the following discussion is about how the vortex looks for those caught in the flow, and that makes for a dizzying array of perspectives. Drifting along in a vortex, one can observe how things move around, how they change in shape and substance, how things come together in new arrangements, and how humans are at the mercy of the elements, or at least feel that way. This makes for a rough ride in the following pages, and that is by all means intentional. This book grew out of a sense of disaffection with world histories where the narrative was oozing order.

For all the material heft of masses in motion, humans retain agency inside a vortex, albeit to widely different extents. Some command powerboats that rule the waves (and make a few more) while others are condemned to swim on their own. Some people have access to the levers that regulate flows while others need to work with the currents as they are. By and large, agency is about resources and power relations rather than smartness. Idiots can run powerboats, too, and more than one captain has proudly steered his boat into the shallows, a reef, or the abyss. Disorientation and delusion are common experiences inside the vortex because so many things are constantly in motion.

The one thing that unites everything inside the vortex is that it is exceedingly difficult to look beyond the roaring waters. A lot of things are open to many different perspectives, and vantage points and experiences are constantly in flux, but taken as a whole, the vortex is cognitively closed: a distinct universe that offers no certainties beyond its purview. There is no island inside a vortex, no terra firma where alternative projects can take root. As seen in the Gandhi chapter, alternative projects were merely another thing that was drifting along, and even an otherworldly figure like the mahatma was riding with the waves at times. And why would he not? There are many ways to stay above water in a vortex, but apathy is rarely a winning strategy.

It is an open question whether people, if given a choice, would wish to swim in rough waters. But for those who live in the twenty-first century, the question is ultimately pointless: we are condemned to engineer and navigate the vortex for better or worse. There was a world with humans before the vortex, and there may be one after the vortex has run its course, but engaging with either provides limited guidance, if any, as we wrestle with the mess that we're in. If there is a silver lining, it is that we do not need to learn how to navigate and engineer the vortex from scratch. This would be an obvious point if it were not for a few people who suggest otherwise.

THE ANTHROPOCENE DELUSION

When I started writing this book, the Anthropocene was the buzzword du jour. It was already around for more than a decade—I will talk about the birth of the Anthropocene in the chapter on the 1970 Tokyo Resolution[14]—but the "Big Bang" of the Anthropocene discourse, a meeting at the Geological Society of London and a subsequent cover story of the *Economist* in May 2011, was still fresh. A decade later, the Anthropocene has entered the environmental literature and the environmental imagination, but popularity has taken its toll. The concept is cited prolifically, sometimes ad nauseam, but its precise meaning is more diffuse than ever. Even textbooks on the Anthropocene have abandoned the idea of a coherent concept and they note by way of introduction that they "do not cover all the modes of understanding that might be brought to bear on the Anthropocene."[15] There is also a mushrooming array of sister terms: capitalocene, carbonocene, technocene, plantationocene, wasteocene, and so forth.

The blame goes mostly to a chatty academic field that is named the humanities. The Anthropocene is a pretty straightforward concept in

natural-science terms, thanks in large part to rigorous processes of scientific consensus building. The International Commission on Stratigraphy set up an Anthropocene Working Group in 2009 and gave it the task "to assess whether the Anthropocene could be considered a potential chronostratigraphic/geochronologic unit." The Working Group replied in the affirmative seven years later and proposed 1950 as the threshold year for a new epoch.[16] The official proclamation was pending when this book went to press. The Anthropocene is also a familiar term in earth system science, a multidisciplinary endeavor that aims to model material and energy flows on a planetary scale. Insights from earth system research are cited throughout this book.

It is open to debate whether historians should embrace a chronological framework where everything is about one single threshold.[17] But when it comes to the significance of humans for planetary processes, the evidence is clear. Humans have played an outsized role in the environments on this globe, and it is impossible to understand the present state of this planet if we do not account for the impact of humans, and none of the following remarks shall suggest otherwise. In the words of the Working Group on the Anthropocene, "It is clear that human beings are now operating as a major geological agent at the planetary scale, and that their activities have already changed the trajectory of many key Earth processes, some of them irreversibly, and in doing so have imprinted an indelible mark on the planet."[18] No other species comes close in its significance for material and energy flows on planet earth, and there is no serious debate whether something like the Anthropocene exists in scientific terms. The question is how it matters for our view of history and the way forward.

We have entered a new age in terms of planetary materialities and ecologies. But does this mean that we have new *people*? Humans launched what we retrospectively call the "project of modernity," and they have entered new ages of lesser scales and scopes all the time: the age of automobility, the age of industrial chemistry, the age of fascism, and so forth. But as this volume shows, entering a new age did not mean that humans shed their baggage and started from scratch. Quite the contrary, the global environmental legacy that this book seeks to dissect is the cumulative product of numerous processes that involved an even greater number of groups all over the world, and we keep adding to this legacy on a daily basis. There is no delete button in the modern mind, and as the following narrative shows, humans are far

less forgetful than they usually think. A lot of history resonates in today's environmental thought and action, except that we rarely recognize this history as such.

The Anthropocene literature is huge, but it seems that these divergent views are impossible to reconcile. We have entered a new epoch in environmental terms, but we do not have new mindsets, cultures, or societies. We enter the Anthropocene with a lot of baggage: culturally, politically, economically, socially, materially, and technologically. In fact, the key challenge is to find new paths that are compatible with the minds, the routines, the institutions, the artifacts, and the expectations that we have acquired over decades and centuries. The Anthropocene does not mean that we write on a blank canvas. We merely add another layer of notes on a densely scribbled parchment with many different colors and all sorts of handwriting.

If we stick to this metaphor, the task of this book is to make that parchment legible in full and to tell the stories it records, at least in some broad outlines. The next task, far beyond the abilities of the present author, will be to bring these insights to bear on a circle of experts who seem to get overexcited about the earth in their hands. We see it in glaring form in the recent debate over climate modification. The Anthropocene debate has boosted the standing of the geoengineering community, as it provides their megalomaniacal schemes with a semblance of normality. If we are going to tamper with the earth system anyway, why not do it along the lines of sophisticated knowledge from a world-leading class of experts?[19] One might shrug it off if it were not so characteristic of an obvious strand of expertocratic self-aggrandizing that runs through the Anthropocene discourse. For all its diversity, the Anthropocene discourse has operated in top-down mode since its inception, and it shows. A few years back, earth system governance might have appeared as the pinnacle of intellectual arrogance, but there is actually a journal with that name now.

It is not wrong to have big plans for a planet in trouble. If anything, climate policy has been too timid in recent decades, and that is not the only environmental challenge where humans have fallen behind planetary needs. The delusion starts with the idea that expertocratic blueprints can actually be engines of change—they are mere lubricants at best. Readers can see the outcomes of expertocratic delusions scattered through this book, and this is a topic where history speaks with exceptional clarity: there is a difference between good intentions

and good policies, and seeing like a state is not a good idea, particularly when it becomes the only way that people see the world.[20] We really should not go there another time.

NARRATING THE NONLINEAR

This book is about a paradox. Never have more people agreed that the environmental crisis is global, and never has it been less clear what this means. History cannot solve this puzzle, but it can provide an idea of how we came to this point. More precisely, it can provide a multitude of ideas to that effect. These ideas are large and small, obvious and hidden, material and cultural, and no, they do not add up. Insights do not even come in clear packages. In this book, narratives work on different levels and in many different directions, all in an effort to sow a healthy distrust in the stories that we have become accustomed to: linear narratives with a start, an ending, and a clear moral message. These stories provide a sense of order and orientation, or rather the semblance thereof. But as this book shows, linear narratives do not really work inside the vortex.

The essay style of this book is not just a fancy extra that serves to keep readers in thrall throughout a long text. It is a logical extension of the conceptual framework, and perhaps the only way to explore the vortex in adequate fashion. This is a book about dynamism, and that calls for a narrative that allows readers to *experience* dynamism. The essay style is a means to evoke the sense of dizziness that life in the vortex tends to produce, and readers are advised to brace themselves for a bumpy ride. One chapter connects the battery chicken with neoliberalism, sea turtles, o.b. tampons, and the Falklands War (yes, there is a connection) while another links a women's cooperative in Bangladesh with the space shuttle. Materialities can create bizarre connections, and they are more than anecdotal: they are what modern life is about. Modernization operates through a global web with many nodes, weaving continues in our time, and that should instill a sense of humility in every conversation about the flow of history. As Heraclitus might have said, you never step into the same vortex twice.

Nonlinear narration faces limits at the printing press. The complexity of the planet is fundamentally at odds with the linearity of writing. Texts are about one word after another, one sentence after another, and one paragraph after another, and our collective obsession with mobility and connectivity has not changed what one might call

the natural order of textuality. At some point, authors need to decide on a certain sequence of chapters, if only because publishers wish to have pages in order before binding, but readers are encouraged to subvert this given structure and follow interlinkages or one of the following paths through the book. Jumping chapters is a common sin among readers, but in the book at hand, it is actually encouraged. You may learn more from this volume if you do not read it from cover to cover.

Interconnections can be about many different things, and this book pursues them in many different forms: spatial, temporal, causal, material, and imagined. The case of guano may serve as an example. It relates to synthetic nitrogen because both substances were used as fertilizers. Guano was a commodity from Latin America, just like Potosí's silver and the bananas of United Fruit. Farmers used fertilizer on fields for which they had a land title, and probably on land that was previously a swamp and had been drained with the help of eucalyptus trees. Guano was one of the first auxiliary substances that farmers were buying, thus starting a tradition that would continue with calcium arsenate (used lavishly in the fight against the boll weevil), hybrid seeds, and DDT, and advice on guano use came from a new cadre of chemically trained experts. Seen in this way, guano is no separate chapter of environmental history. It is a node in a web that has evolved over time.

There is no given hierarchy among these nodes, the linkages, the paths, or the rationales that they imply. Such an approach subverts the convenient compartmentalizations of traditional case studies, but more significantly, it challenges the self-perceptions of powerful stakeholders. Generations of agriculturalists have argued that feeding the world is the cardinal challenge, and utilities and oil companies have made a similar case about energy, but in the twenty-first century, it should be clear that these fundamentalisms serve specific interests. Feeding the world is obviously important, but so are fertile soils, and food safety, and labor relations, and all the other things that are at play in global food chains. A hierarchy of issues, or a conviction that only one of these aspects really matters, is at odds with the experience of recent years that all these issues matter—somehow. The mess we're in calls for some kind of balance rather than a hierarchy of issues.

With that, the chapters of this book are an effort at decentering narratives. They present different storylines that intersect, clash, or come together in expected and unexpected ways. To be sure, this does

not mean that all interconnections have equal weight. Interconnections are in play on many levels and in all sorts of forms, they vary in intensity and resilience, and they do not always make a difference. Some connections are superficial or anecdotal, others are matters of life and death, and many are somewhere in between, and we can assess their significance more clearly if we stay close to real-world events. While other global histories look at large countries or general problems, this book prefers specific places with specific issues: silver mining in Potosí, the dodo on Mauritius, Chicago's slaughterhouses, and London smog.

Individual chapters sketch a story that revolves around a certain place, an artifact, a commodity, and so forth, but case studies serve a higher purpose in this book. They are exemplary explorations of general challenges—mining, the extinction of species, the industrialization of the meat commodity chain, and particulate emissions—and they mirror places that exist all over the world: mining regions, islands, hubs, and industrial cities. In a modern world where everything is in flux, it seemed to be the least intrusive approach to organize the book around challenges, and the ultimate goal of each chapter is to explore one or more challenges that humans have met all over the world. They may not capture all the experiences that have shaped the environmental history of the modern world: the rough waters of the vortex do not allow for comprehensiveness in the real sense of the word. But they capture the challenges that matter the most if you want to understand the interplay of humans and the natural environment in the world that we live in.

The chosen examples serve as nubs for similar experiences from other parts of the world, but always in a tepid fashion. That leaves plenty of room for individual experiences, and the essay style invites readers to add their own trains of thought. If you have a nature reserve that you care about, or if you care particularly about an endangered species, or if you have a favorite food, it may be a worthwhile attempt to map your own views in light of the chapters on Kruger National Park, the dodo, or a selection of chapters from the agricultural path. As an added benefit, this helps to exorcise the pretense of comprehensiveness that weighs heavily on any world history book. Every synthesis is selective, and global ones are selective in the extreme, but that becomes less of an intellectual problem if the narrative fails to convey an air that this is the full story. In each individual chapter, the goal is to identify the defining threads that, in my humble judgment, run

through every story of its kind on the globe, and readers are encouraged to put that claim to the test in light of their own experiences.

An exemplary approach hinges on the judicious choice of these case studies. I elaborate about the quandaries of making choices in the appendix, and it shall suffice to say at this point that these choices were about significance (many were about a global first, or a defining act in material or metaphorical terms), about covering the full range of environmental challenges, and about capturing the diversity of the world. The narrative seems to digress at times, but looking at other places and artifacts helps tease out the common themes that resonated around the globe. For example, the chapter on the Canal du Midi makes a point of bringing in other canals and other traffic links, including the railroad and the motorway that run parallel to the Canal du Midi today. This does not mean that all canals around the world are essentially the same. We have plenty of case studies about specific traffic links, and I draw on some of them, but we are underplaying the value of case studies when we treat each canal as immediate to God. The Canal du Midi, along with many other projects, is also about what I call the Great Mobilization.

The narrative offers two different ways to engage with the interconnectedness of the modern world. The text includes cross-references to other chapters whenever issues are touched upon that are discussed in greater depth elsewhere. These cross-references operate in the manner of hyperlinks, and today's readers do not need further instructions as to their use. The second option is the following list of paths. They highlight a range of topics or key challenges that run through this book, and readers should see these paths as virtual sections on a par with the eight official ones. The chapters of this book are nodes that make sense in different narrative threads, and these threads go into different directions, intertwine and reinforce each other, or stand at odds. It matters beyond individual themes. If we read chapters as treatises on specific topics as well as crossroads of various big trends, we gain a deeper understanding of the improvised, patchwork nature of our modern existence. The "project of modernity" was (and is) more akin to a large construction site with a multitude of blueprints, work crews, and professional skills, where communication and coordination were often fragile at best.

In other words, do not let the table of contents fool you. This is not a book with forty chapters in eight parts plus one interlude and a coda as bonus material. It is a book with twenty-nine parts, and on average,

individual chapters come up in eight of them. And if you find that a confusing overabundance of roadmaps, or if you are not into roadmaps at all, let me remind you that environmental historians have an innate sympathy for ramblers. Readers are invited to subvert the prelaminated structure and chart their own individual path through this book. Chapters cover different issues, different time periods, and different places on the globe, but they all give an impression of the dynamisms, the interconnections, and the many choices, some irreversible, some open to change, that people have made as the flow of modern history has run its course. Experiences inside the vortex have never been uniform, and will never be. Neither should the experiences of those who read this book.

PATHS THROUGH THIS BOOK

THE AGRICULTURAL PATH

Food is essential to human life, but the daily bread changed dramatically in modern times. It was produced with new methods in distant places, it was judged with new categories like calories, new corporations supplied seeds and fertilizers while other companies took care of slaughtering and marketing, and then there were the unexpected events: pests and diseases, soil erosion, and slaves who refused to eat their designated food. A lot of things are waiting to be disentangled along the path of modern agriculture.

Sugar (chapter 2), the Land Title (chapter 6), Breadfruit (chapter 7), Guano (chapter 8), United Fruit (chapter 10), the Boll Weevil (chapter 12), the Little Grand Canyon (chapter 13), Cane Toads (chapter 14), Chicago's Slaughterhouses (chapter 18), Synthetic Nitrogen (chapter 19), Opium (Interlude), Hybrid Corn (chapter 28), the Rice-Eating Rubber Tree (chapter 30), Holodomor (chapter 31), the Pontine Marshes (chapter 32), the Chemurgy Movement (chapter 33), Battery Chicken (chapter 36), and DDT (chapter 38).

THE PATH OF INDUSTRY

Just like agriculture, industry was about doing familiar things in a different way: with new technologies, new resources, new institutions and expert groups, a growing distance between producers and consumers, and way more stuff. The path of industry is about innovation, about risks and unexpected side effects, about fabulous wealth and who gained a share of it—and about changing ideas concerning what we really need.

Potosí (chapter 1), Shipbreaking in Chittagong (chapter 5), Guano

(chapter 8), Whaling (chapter 9), United Fruit (chapter 10), Saudi Arabia (chapter 15), London Smog (chapter 16), Chicago's Slaughterhouses (chapter 18), Synthetic Nitrogen (chapter 19), Air-Conditioning (chapter 20), Hybrid Corn (chapter 28), Aswan Dam (chapter 29), the Chemurgy Movement (chapter 33), the Pine Roots Campaign (chapter 35), Battery Chicken (chapter 36), *Lucky Dragon No. 5* (chapter 37), DDT (chapter 38), *Torrey Canyon* (chapter 39), and Plastic Bags (chapter 40).

THE WOODEN PATH

Forests are the world's most complicated terrestrian ecosystem. They are also about plants that grow rather slowly, at least until modern science invented the turbocharged eucalyptus. Most of all, the forest history of the modern era is about the rise of state power and the incorporation of woodlands into resource-hungry economies. The wooden path also looks into the many other uses of trees and forests that fell by the wayside over the course of modern history.

Sustainable Forestry (chapter 4), Breadfruit (chapter 7), Kruger National Park (chapter 26), Eucalyptus (chapter 27), the Rice-Eating Rubber Tree (chapter 30), and the Pine Roots Campaign (chapter 35).

THE MINING PATH

The underground was full of dangers—and full of precious stuff. The mining path traces the way from silver mines to bulk commodities like coal and bauxite, from mountains with tunnels to giant holes, from resource boomtowns to resource states, and it inquires about pollutants and leftovers. Do you want to have a piece of Potosí's Cerro Rico? Just take a deep breath.

Potosí (chapter 1), Guano (chapter 8), Saudi Arabia (chapter 15), and London Smog (chapter 16).

THE PATH OF THE ANIMALS

It was people who built the modern world, but they had plenty of nonhuman companions. They were, among other things, hunted, slaughtered and eaten, watched and adored, bred and confined, feared and killed, and pushed into oblivion. Plenty of reason to look them in the face.

Guano (chapter 8), Whaling (chapter 9), the Dodo (chapter 11), the Boll Weevil (chapter 12), Cane Toads (chapter 14), Chicago's Slaughterhouses (chapter 18), Kruger National Park (chapter 26), Battery Chicken (chapter 36), and DDT (chapter 38).

THE INFRASTRUCTURE PATH

Infrastructure is a neologism. People were content to talk about roads, canals, and other concrete things until the rise of new systemic technologies that became the backbone of modern life. Infrastructures served transportation, moved and delivered water, and satisfied food and energy needs and the longing for cool air. They also created plenty of problems. But who can imagine a modern world without infrastructures?

The Canal du Midi (chapter 3), the Water Closet (chapter 17), Chicago's Slaughterhouses (chapter 18), Air-Conditioning (chapter 20), Cholera (chapter 21), Aswan Dam (chapter 29), the Pontine Marshes (chapter 32), Autobahn (chapter 34), and *Torrey Canyon* (chapter 39).

THE PATH OF ENERGY

Energy is a physical quantity—and a myth of modernity. It was available in many forms, open to transformation, ephemeral and omnipresent, and it came at a price. It was not necessarily the end user who was paying it.

Sugar (chapter 2), Sustainable Forestry (chapter 4), Breadfruit (chapter 7), Whaling (chapter 9), Saudi Arabia (chapter 15), London Smog (chapter 16), Synthetic Nitrogen (chapter 19), Air-Conditioning (chapter 20), Opium (Interlude), Aswan Dam (chapter 29), the Chemurgy Movement (chapter 33), Autobahn (chapter 34), the Pine Roots Campaign (chapter 35), *Lucky Dragon No. 5* (chapter 37), *Torrey Canyon* (chapter 39), and Plastic Bags (chapter 40).

THE PATH OF POLLUTION

Dirt is matter in the wrong place, but good luck explaining that to workers in Bangladeshi shipbreaking. Pollutants mirrored and reaffirmed the fissures that ran through societies. They also became subject to control programs—sometimes. They have consequences from urban decay to global warming. They also provide a showcase on how environmental problems are social constructs. If you follow the path of pollution, you will not call it a problem again without inquiring for whom, and in which way.

Potosí (chapter 1), Shipbreaking in Chittagong (chapter 5), London Smog (chapter 16), the Water Closet (chapter 17), Synthetic Nitrogen (chapter 19), Cholera (chapter 21), the 1970 Tokyo Resolution (chapter 24), *Lucky Dragon No. 5* (chapter 37), DDT (chapter 38), *Torrey Canyon* (chapter 39), and Plastic Bags (chapter 40).

THE COLONIAL PATH

Colonialism has many faces, and none is pretty. The colonial path explores spatial inequality in its full breadth: the new order of the globe, the tools, the profiteers and their bounty, the sources of power, and the resistance. The focus is on the consequences of colonial relations and how they survive through daily routines. Colonialism is about doing.

Potosí (chapter 1), Sugar (chapter 2), Sustainable Forestry (chapter 4), Shipbreaking in Chittagong (chapter 5), the Land Title (chapter 6), Breadfruit (chapter 7), Guano (chapter 8), Whaling (chapter 9), United Fruit (chapter 10), the Dodo (chapter 11), the Boll Weevil (chapter 12), Cane Toads (chapter 14), Saudi Arabia (chapter 15), Opium (Interlude), Gandhi's Salt (chapter 23), the 1970 Tokyo Resolution (chapter 24), Kruger National Park (chapter 26), Eucalyptus (chapter 27), Aswan Dam (chapter 29), the Rice-Eating Rubber Tree (chapter 30), Holodomor (chapter 31), the Pontine Marshes (chapter 32), DDT (chapter 38), *Torrey Canyon* (chapter 39), and Plastic Bags (chapter 40).

THE WATERWAY

Look at the earth from space, and you understand the rationale for this path: more than two-thirds of our planet is underwater. The waterway looks at the open sea, at canals and rivers (free-flowing and dammed), at transportation and maritime resources, and at clean and dirty water and all the stuff that goes with the flow.

The Canal du Midi (chapter 3), Shipbreaking in Chittagong (chapter 5), Guano (chapter 8), Whaling (chapter 9), the Water Closet (chapter 17), Cholera (chapter 21), Aswan Dam (chapter 29), the Pontine Marshes (chapter 32), *Torrey Canyon* (chapter 39), and Plastic Bags (chapter 40).

THE PATH OF CHEMISTRY

Three centuries ago, chemists were sorcerers of sorts who believed in things like phlogiston. Today they make up one of the most powerful branches of the natural sciences, and they underpin one of the greatest industries in the world. This path looks at the chemists, their work, their products, their power (or lack thereof), and their blunders. Yes, they did kill small children. And they got away with it.

Potosí (chapter 1), Guano (chapter 8), Whaling (chapter 9), Synthetic Nitrogen (chapter 19), Opium (Interlude), the Chemurgy Move-

ment (chapter 33), the Pine Roots Campaign (chapter 35), DDT (chapter 38), and Plastic Bags (chapter 40).

BOTANICAL TRANSFERS

Eucalyptus in California, breadfruit in the Caribbean, cane toads in Australia—in the modern era, organisms traveled like never before. This path is about how it happened and why it matters. (Spoiler: Kew is overrated.)

Sugar (chapter 2), Breadfruit (chapter 7), the Boll Weevil (chapter 12), Cane Toads (chapter 14), Eucalyptus (chapter 27), and Hybrid Corn (chapter 28).

BUILDING THE STATE

Police states, welfare states, failing states, l'état, c'est moi: the power of the state is a defining feature of global modernity. It mattered for environmental challenges—and, in turn, state power was built through the environment. Do you think that there should be a law? Maybe read these chapters first.

Potosí (chapter 1), Sugar (chapter 2), the Canal du Midi (chapter 3), Sustainable Forestry (chapter 4), the Land Title (chapter 6), Whaling (chapter 9), United Fruit (chapter 10), Saudi Arabia (chapter 15), London Smog (chapter 16), Opium (Interlude), Gandhi's Salt (chapter 23), the 1970 Tokyo Resolution (chapter 24), the 1976 Tangshan Earthquake (chapter 25), Kruger National Park (chapter 26), Aswan Dam (chapter 29), the Rice-Eating Rubber Tree (chapter 30), Holodomor (chapter 31), the Pontine Marshes (chapter 32), the Chemurgy Movement (chapter 33), Autobahn (chapter 34), the Pine Roots Campaign (chapter 35), Battery Chicken (chapter 36), *Lucky Dragon No. 5* (chapter 37), DDT (chapter 38), *Torrey Canyon* (chapter 39), and the Pandemic (Coda).

BUILDING PROFESSIONS

They were the priests of a new epoch—and the people that nobody knew. There is a profession for every environmental challenge today (and sometimes more than one), but that is the result of a long history. This path traces the making of expert groups, their quest for resources and power, their struggles, their resilience—and the stories that they tell. Experts may not save the planet. But we will not save the planet without experts either.

Sustainable Forestry (chapter 4), Breadfruit (chapter 7), Guano (chapter 8), the Dodo (chapter 11), the Boll Weevil (chapter 12), the Little Grand Canyon (chapter 13), Cane Toads (chapter 14), Synthetic Nitrogen (chapter 19), Air-Conditioning (chapter 20), Cholera (chapter

21), Baedeker (chapter 22), Eucalyptus (chapter 27), Hybrid Corn (chapter 28), Aswan Dam (chapter 29), the Chemurgy Movement (chapter 33), DDT (chapter 38), *Torrey Canyon* (chapter 39), and the Pandemic (Coda).

ECONOMICS 101

Sounds like a pathway for nerds? You may not be interested in the economy, but the economy is interested in you. This path provides a tour d'horizon of economic concepts that were in play in the modern era. It is a rather male-heavy path, but it includes a female Nobel laureate who criticized the discipline's penchant for models and the man who penned the theory of interstellar trade. The toolbox of economics deserves scrutiny even if you will never buy antimatter futures.

Potosí (chapter 1), Sugar (chapter 2), the Canal du Midi (chapter 3), Shipbreaking in Chittagong (chapter 5), Whaling (chapter 9), United Fruit (chapter 10), Saudi Arabia (chapter 15), Chicago's Slaughterhouses (chapter 18), Gandhi's Salt (chapter 23), the Rice-Eating Rubber Tree (chapter 30), and Battery Chicken (chapter 36).

THE DEVELOPMENTALIST PATH

Say what you will about development, but it is complicated. So maybe there was that one thing that could change everything and catapult a place, a region, or a country into modern times? This path is about a dream that refuses to die.

The Canal du Midi (chapter 3), Guano (chapter 8), United Fruit (chapter 10), Saudi Arabia (chapter 15), Eucalyptus (chapter 27), Hybrid Corn (chapter 28), Aswan Dam (chapter 29), the Rice-Eating Rubber Tree (chapter 30), the Pontine Marshes (chapter 32), and DDT (chapter 38).

THE CARNIVOROUS PATH

Gandhi ate meat—though only to give it a try. Others were less restrained. This path traces the full range of consequences.

Guano (chapter 8), Whaling (chapter 9), the Dodo (chapter 11), Cane Toads (chapter 14), Chicago's Slaughterhouses (chapter 18), Gandhi's Salt (chapter 23), and Battery Chicken (chapter 36).

THE PATH OF DISASTER

Sometimes things do not go as planned. And sometimes things go disastrously wrong. This path is about the latter, the sudden events, the cata-

clysms—and about what happens when the dust settles. Disasters matter, but not in the way most people think.

The Boll Weevil (chapter 12), the Little Grand Canyon (chapter 13), Cane Toads (chapter 14), London Smog (chapter 16), Cholera (chapter 21), the 1976 Tangshan Earthquake (chapter 25), Holodomor (chapter 31), *Lucky Dragon No. 5* (chapter 37), *Torrey Canyon* (chapter 39), and the Pandemic (Coda).

THE PATH OF WAR

War is no longer the father of everything, as Heraclitus surmised in ancient Greece. But in sixteen of the following chapters, the imprint of war was strong enough to warrant inclusion in this path. Chapters look at preparations for war, resource allocation in war, wars for oil (and quite a few other resources), and at the mental worlds that this has produced. Fighting for change? Campaigning for justice? That is where it starts.

Potosí (chapter 1), Sugar (chapter 2), the Canal du Midi (chapter 3), Whaling (chapter 9), United Fruit (chapter 10), the Boll Weevil (chapter 12), Synthetic Nitrogen (chapter 19), Opium (Interlude), Cholera (chapter 21), the 1976 Tangshan Earthquake (chapter 25), Holodomor (chapter 31), the Pontine Marshes (chapter 32), Autobahn (chapter 34), the Pine Roots Campaign (chapter 35), *Lucky Dragon No. 5* (chapter 37), and DDT (chapter 38).

THE MOBILITY PATH

We live on a small planet, but it is large enough to make mobility a challenge of its own. This path looks at the technologies that facilitate mobility in one form or another, at the resources in play, and at the consequences for humans and environments. Please choose your speed judiciously.

The Canal du Midi (chapter 3), Whaling (chapter 9), Cane Toads (chapter 14), the Water Closet (chapter 17), Chicago's Slaughterhouses (chapter 18), Cholera (chapter 21), Baedeker (chapter 22), Aswan Dam (chapter 29), the Chemurgy Movement (chapter 33), Autobahn (chapter 34), the Pine Roots Campaign (chapter 35), *Torrey Canyon* (chapter 39), Plastic Bags (chapter 40), and the Pandemic (Coda).

THE PATH TOWARD THE MODERN CITY

For the first time in human history, the majority of people live in cities. This path is about how we made it happen—and what it means for the world.

Potosí (chapter 1), Shipbreaking in Chittagong (chapter 5), London

Smog (chapter 16), the Water Closet (chapter 17), Chicago's Slaughterhouses (chapter 18), Air-Conditioning (chapter 20), Cholera (chapter 21), Baedeker (chapter 22), the 1976 Tangshan Earthquake (chapter 25), Aswan Dam (chapter 29), and Autobahn (chapter 34).