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Introduction

Come skill, and the cunning needed;
lay out, the lie of the land;
secret stories, beneath the feet,
locked up in layers, in levels below.

...

Unlock the store, of stories here.

MICHAEL ROSEN, "CHARMS FOR GRIME'S GRAVES" (2009)

OF ALL THE material legacies of Britain's industrial, imperial era, which will last the longest? If you ask a geologist, the answer would be mines. Jan Zalasiewicz, chair of the Anthropocene Working Group of the International Commission on Stratigraphy, has written with Colin N. Waters and Mark Williams that "the extensive exploitation of the subsurface environment" (4) that commenced with the British Industrial Revolution is an anthropogenic phenomenon with "no analogue in the Earth's 4.6 billion year history" (4). "Anthroturbation"—their term for human delving into the earth and its resulting geological transformation—"shows notable inflections" in the period following the early nineteenth-century rise of the steam engine, and while such subsurface modifications are easily neglected because they are "out of sight, out of mind," the "deep subsurface changes . . . are permanent on any kind of human timescale, and of long duration even geologically." These mines have "imprint[ed] signals on to the geological record," in other words, that will outlast almost everything (3).

The rise of industrialized mining was a geologically legible event, notable even in the context of sublimely deep timescales, but does the literature of the period attend to this unprecedented transformation taking

place under its authors' feet, and if so, how? To ask these questions is to invite broader questions about the extent to which literature is embedded in natural environments and histories, and the extent to which humanist critique can take on concerns of geological scale—questions that are now being explored within and beyond the fields of nineteenth- and early twentieth-century literature.¹ To ask these questions is also to ask what industrial extraction meant, and how it transformed humans' relation to and perception of the natural world. Kenneth Pomeranz has described the period around the Industrial Revolution as the moment when correlated factors of "overseas extraction" and Britain's "epochal turn to fossil fuels" produced nothing short of a new global economy (23). Certainly, many writers and observers at the time remarked on the extraordinary new scope of underground extraction; in an 1892 account originally published in the magazine the *Graphic*, for example, Randolph Churchill reports on a treasure-hunting journey to South Africa and the colossal size of the diamond mines he saw there: "the De Beers and the Kimberley mines are probably the two biggest holes which greedy man has ever dug into the earth" (40–41). Big holes and greedy men feature frequently in mining literature, as we shall see, but the ripple effects of the global project of industrial extraction transformed literature and narrative at a far more fundamental level, and literature's mediation of extractivism reshaped form, genre, and discourse in ways that this book will describe.²

Extraction Ecologies sets out to show that the industrialization of underground resource extraction shaped literary form and genre in the first century of the industrial era, from the 1830s to the 1930s, just as literary form and genre contributed to new ways of imagining an extractible Earth. Industrialization was a long process that happened unevenly across the globe, and the "industrial era" is admittedly a rather imprecise and local designation, but I use the term in this book to describe the period that began in the early 1830s with the decisive shift to steam power in British manufacturing and distribution and ended in the late 1930s with the dawn of the nuclear era and the launch of the Manhattan Project.³ With this chronology I do not intend to convey a steady, sequential parade of energy regimes, as though extracted fossil fuels were unimportant before 1830 or ceased to matter when the expansion of atomic theory gave birth to a new vision of energy as existing in all matter (not just subsurface hydrocarbons). What I do hope to capture, however, is a period when Britain came to understand itself as an empire thoroughly dependent on extraction: an extraction-based industrial society irretrievably bound

up with the mining of underground material, with no viable alternative capable of preserving existing social relations.⁴ Just as the rhythms of agricultural life and labor are bound up in the forms of the pastoral, I argue, the age of industrial extraction ushered in a new sense of human-natural relations, and with it a new literature.⁵

Mining has a long history, but large-scale industrial mining was a nineteenth-century phenomenon, and *Extraction Ecologies* explores the magnitude of its socio-environmental impact—an impact that extends deeply into literature and culture and deeply into the present. In this book I interpret literary form and genre as signals for habits of mind and ways of thinking about the world that have material causes as well as long-term material effects. Form and genre are important objects of environmental analysis, I argue, because they are epistemological structures that embed our most fundamental conceptual formations; what is more, they are mobile and repeatable across time and space. My aim is to show how such conceptual formations transformed under industrial extractivism, but also to express how literary form and genre produce and extend extractivism as a mode of environmental understanding because of the deep and durational qualities of discourse. In *The Ideas in Things*, Elaine Freedgood notes that “cultural knowledge is stored in a variety of institutional forms” and “is also stored at the level of the word” (23). Words, narratives, forms, and genres both preserve ways of thinking about the environment and carry them forward. Ursula Le Guin imagined fiction as a “carrier bag” for storing and sharing the story of life, prompting Donna Haraway to wonder what the “carrier bag for terraforming” might include (Haraway 121). *Extraction Ecologies* is about literary-environmental exchange, the “carrier bag for terraforming,” and it rests, finally, on the idea that discourse makes environment as environment makes discourse. There is a temptation, in a project like *Extraction Ecologies*, to turn to meta-analysis focused on surface reading, text mining, and other methodological debates in literary studies, but in the following chapters I have sought instead to maintain a focus on the material impacts of extraction as mediated through literature and to avoid getting lost in the metaphors of mining to the extent that I can. Because of the durational qualities of language, genre, and form, literature engages with environmental materiality across time, and for this reason it is a crucial archive for understanding the relation between environmental history and environmental crises today.

The urge to think now about extraction, ecology, and literature comes both from the relentless ecological calamities that surround us in our

troubled present and from a recognition of the long historical roots of these calamities. Two centuries into industrial life, we find ourselves in the midst of ecological emergency, and many of the most pressing hazards associated with this crisis can be traced to the extraction-based economy that emerged with Britain's early nineteenth-century transition to steam. From metals to minerals to coal, the British imperial world saw a ramping up of extraction as the steam engine and other new technologies, including new explosives such as dynamite and TNT, contributed to a massive acceleration in extraction and the global establishment of an extractivist version of ecological imperialism.⁶ The extraction boom indelibly marked the natural and social worlds of the industrial era and beyond, and this book shows how literature is bound up with industrial ecologies and the conditions of existence that govern life within them.

Extraction Ecologies

My titular phrase “extraction ecologies” is intended to suggest a tension between its two key terms. The word “extraction” is from the Latin *extrahere*, to draw out, and its first definition in the *Oxford English Dictionary* is “the action or process of drawing (something) out of a receptacle; the pulling or taking out (of anything) by mechanical means.” “Ecology,” on the other hand, was first used in 1866 by German biologist Ernst Haeckel to denote the principles of interrelationality and interdependence that characterize natural life: “By ecology, we mean the whole science of the relations of the organism to the environment including, in the broad sense, all the ‘conditions of existence.’ These are partly organic, partly inorganic in nature.”⁷ While the underlying idea of “extraction” thus presumes the ability to withdraw one component from the “receptacle” of nature, “ecology,” by contrast, suggests a complex of interdependences from which no single part can be removed in isolation. The industrial era saw a pronounced tension between these two formulations of nature: just as new ecological and evolutionary theories of the natural world were coming to recognize the profound interdependence of its many parts, new industrial technologies were perfecting capacities for the removal or derangement of these parts.⁸

Human extraction of underground mineral resources has a long history, dating back to the Neolithic and even the Paleolithic eras. “Charms for Grime’s Graves,” the series of poetic “charms” from which I take my epigraph, was inspired by a forty-five-hundred-year-old flint mine—one of very few known to exist in Britain. The land around Grime’s Graves remains, to this day, pockmarked by hollows and pits, but such early

human etchings on the landscape—such stories of Earth’s stores, to use the poem’s alliterative language—lack the magnitude of industrial mining in terms of depth and pervasiveness. It was the water table that prevented earlier forms of mining from making an indelible stratigraphic signature of the kind Zalasiewicz, Waters, and Williams identify with the industrial era. In the struggle against groundwater, steam-powered pumps to drain the mines of water were a crucial turning point at which industrial-scale anthropogenic exploitation of the subsurface could really begin.⁹ This is one reason that *Extraction Ecologies* will focus on extraction as an *activity* rather than on a particular mineral commodity such as coal, for mining of all kinds was transformed and accelerated by the technology of steam.¹⁰

The steam engine as a signal event in environmental history has been much discussed, but what is often unremarked is that it originally developed as a mining technology. Andreas Malm’s *Fossil Capital* provides an in-depth account of how steam power came definitively to supersede water power in the 1830s English textile industry, but long before steam’s capacities had developed to the point where it was able to achieve this, the earliest engines had a narrower purpose: they were built to pump water out of mines. Englishman Thomas Savery first unveiled the atmospheric steam pump in 1702, followed by Thomas Newcomen, who in 1712 “built the first really useful steam engine on the basis of Savery’s patent”: a pump that could “raise as much water as 5 horses” (Sieferle 129). As Matthias Dunn, a mining engineer, wrote in 1844, the steam engine was put into use “for the purpose of drawing water” in the Newcastle coalfields by 1721, and by 1769 there were at least ninety-nine “engines at work drawing water” (22, 24). At this time the engine “was imperfectly understood” and “the collieries in operation were necessarily those whose seams were lying at trifling depths from the surface, and not burthened with any considerable quantities of water” (42). The invention of the automatic centrifugal governor in 1788 was an important advance in engine technology, and in 1800, when James Watt’s patent expired on his more efficient engine, “the fuel savings of his machine quickly resulted in its general success” (Sieferle 131). This was part of “a series of great and organic improvements [that] succeeded each other, not only in the erection of the various steam-engines for pumping, but in every other department of colliery engineering” (Dunn 50).¹¹

By the 1840s, an integrated chain of steam-powered technologies, including everything from pumping to transport, contributed to a dramatic acceleration in coal extraction, and “the winnings of collieries, followed by the building of ships, and the extension of railways, caused an influx of that torrent of capital which has since so completely outrun all

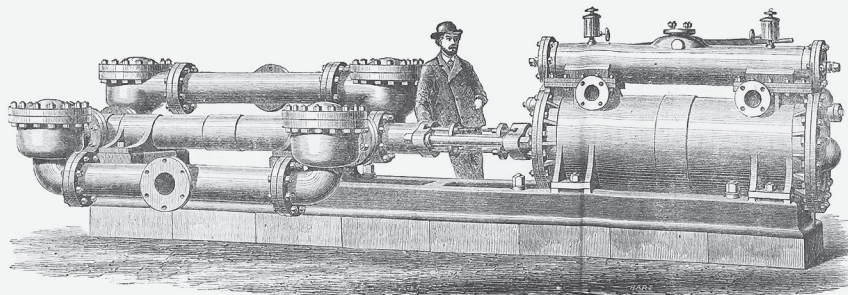
legitimate demand” (Dunn 50). The new capacity to drain mines was thus crucial to a major early nineteenth-century shift in the use of coal in Britain.¹² As E. A. Wrigley explains, “until the end of the eighteenth century coal was almost exclusively a source of *heat* energy. The principal traditional sources of *mechanical* energy, animal and human muscle, remained dominant until the early decades of the nineteenth century.” The Industrial Revolution, in Wrigley’s view, was “accomplished” when coal became a “convenient source” for mechanical energy (*Path* 31). With this change Britain transformed away from an organic economy and became the world’s first extraction-based economy. A published letter from T. Parton of Willenhall neatly sums up this transition in the 3 April 1869 issue of the *Mining Journal*: “the Lord Chancellor now sits upon a bag of wool, but wool has long ceased to be emblematical of the staple commodity of England: he ought to sit upon a bag of coals” (238).

The inauguration of the mining press, as this quotation suggests, announced the new era of industrial extraction with periodicals such as *Quarterly Mining Review* launched in 1830 and the *Mining Journal* launched in 1835, both directed at investors, engineers, and mine owners. The *Mining Journal*, the major periodical in the field, published other works besides the journal at its office in Fleet Street, contributing to a burgeoning professional and technical print culture on extraction¹³ (figure 0.1 shows an advertisement from the *Mining Journal*). Beyond such journals, literature itself was a crucial print mediator or “carrier” of extractivism, as this book will describe. Coal’s rise has now been widely discussed in historical accounts of industrial Britain, but this rise was part of a larger social transformation to an extraction-based life that had cultural, aesthetic, and discursive elements as well as environmental, economic, and technological elements.¹⁴

It is a premise of this study that the extraction of underground mineral resources—not only coal, but gold, iron, tin, copper, silver, and more—can be conceived of as a singular activity, and that this activity of extraction was bound up with a new cluster of socio-environmental conditions: extractivism. The term “extractivism” names a complex of cultural, discursive, economic, environmental, and ideological factors related to the extraction of underground resources on a large, industrial scale. Although my use of the term focuses on the conditions that attend underground mineral resource extraction specifically, I also draw on Naomi Klein’s use of “extractivism” not only “to describe economies based on removing ever more raw materials from the earth, usually for export to traditional colonial powers,” but more broadly as a “resource-depleting model,” a

TANGYE BROTHERS AND HOLMAN,
10, LAURENCE POUNTNEY LANE, LONDON,
CORNWALL WORKS (TANGYE BROTHERS), BIRMINGHAM,
NEWCASTLE-ON-TYNE (TANGYE BROTHERS AND RAKE), OFFICES AND WAREHOUSE, ST. NICHOLAS' BUILDINGS,
SOLE MAKERS OF

THE "SPECIAL" DIRECT-ACTING STEAM PUMPING ENGINES
FOR FORCING WATER FROM MINES.
Nearly 3000 in Use.



The "SPECIAL" Direct-acting Steam Pumping Engines require no costly Engine Houses or massive foundations, no repetition of Plunger Lifts, ponderous Connecting-rods, or complication of Pitwork, and allow a clear shaft for hauling purposes.

FIGURE 0.1. Advertisement from the *Mining Journal*, 11 January 1873, 56.

"nonreciprocal, dominance-based relationship with the earth, one purely of taking . . . the opposite of stewardship, which involves taking but also taking care that regeneration and future life continue" (*This* 169).¹⁵

Of course, there were important differences between mining for coal and mining for gold, not least that coal was mostly mined in Britain and gold was mostly mined on the imperial frontier; I will attend to these differences with care throughout the study, but I want to emphasize here the two major similarities that yoke together these various forms of extraction as a singular activity. First, extraction of all kinds relied on the use of steam for the draining of mines, the crushing of ore, and the transport of mined commodities. Virtually every technological component of the extraction supply chain was accelerated phenomenally by steam power, and thus the accelerated extraction of coal led to more intense exploitation of all subsurface resources, and vice versa. As Rolf Peter Sieferle puts it, "The superabundance of fossil energy put metals into frenzied circulation," which "is the metabolic basis of the new scale of the pollution problem as it arose during industrialization" (137). Secondly, no matter which underground mineral resources were being mined, they were ontologically connected by their material finitude. Finitude and non-reproducibility, above all, distinguish underground resource mining as an extractive process.

Extractive industry can never benefit from regeneration or replenishment of its product but can only move on to a new vein or a new site.¹⁶ The mood of finitude, of removing something that is irreplaceable and subject to looming environmental limits, pervades extraction ecology.

Today the term “extraction” is often used to describe other industries besides mining, industries such as fishing and forestry that likewise involve the removal of raw material from a receptacle where it is ostensibly embedded: trees from a forest or fish from the ocean, for example. These industries are also subject to limits. Old-growth trees are not capable of regeneration on human timescales, as has been brilliantly narrated in Richard Powers’s recent novel *The Overstory* (2018), and worldwide fish populations have been decimated by centuries of overfishing, described movingly in W. Jeffrey Bolster’s *The Mortal Sea* (2012). Forestry and fishing thus might seem to rely on the harvesting of finite resources in the same way as mining, and indeed, many now fear that soil fertility, too, could be a finite resource, subject to overextraction, such that agriculture would fit in this category as well.¹⁷ In 1892, political economist Charles Stanton Devas worried about “exhaustive farming” as well as the “extermination or diminution of useful animals and plants” as two “injuries which the earth has received” in consequence of the Industrial Revolution (79–80), a reminder that animal species or biodiversity, like soil fertility, can similarly be considered finite resources.¹⁸ Such losses have only accelerated since the industrial era, and indeed it is not unreasonable to say that we are now faced with apparent limits for almost every aspect of the natural world that was once considered cyclical: air, water, soil, life itself.¹⁹ The Great Acceleration might be better termed the Great Extraction, or perhaps the Great Subtraction.²⁰

Despite this current crisis of regeneration that seems to touch nearly every part of the natural world on which we depend, this study focuses on the extraction of underground mineral resources because the mining industry presents the overwhelmingly dominant example of resource finitude in the context of historical thought from the 1830s to the 1930s. Trees and fish could, after all, grow and reproduce; gold and tin could not. Regarding soil, for example, Devas affirmed that “though cultivation cannot be kept up *ad infinitum* at a very high pitch of intensity, it can be at a low pitch” (79), and as Paul Warde explains in “The Invention of Sustainability,” it was understood that tree populations, properly managed, could be cultivated to maximize yield while maintaining sustainability for future populations: “the eighteenth century saw the development of ‘sustained-yield’ theory, the cornerstone of modern forestry” (162).²¹

Such reproductive engineering was not possible for metal and mineral resources, which were typically defined in economic terms by their special lack of regenerative capacity. As Siefert puts it, “the subterranean forest can only be felled once” (184), and as W. Stanley Jevons memorably wrote in *The Coal Question: An Inquiry concerning the Progress of the Nation, and the Probable Exhaustion of Our Coal-Mines* (1865), “A farm, however far pushed, will under proper cultivation continue to yield for ever a constant crop. But in a mine there is no reproduction, and the produce once pushed to the utmost will soon begin to fail and sink to zero” (154–55). I will discuss this point at greater length in chapter 1, but what I want to emphasize here is that exhaustion emerged as a distinctive trajectory of extraction-based life. The emergence of a society that was economically grounded in the extraction of finite materials was understood to mean the emergence of a society that was, in a new way, unsustainable for the long run. In this sense, the nineteenth-century grappling with industrial extractivism previews the mode of living that we all experience today, a way of life that proceeds by depleting the future—in other words, the long exhaustion.²²

The Long Exhaustion

The voice of optimism and progress—the voice that sang in the key of investment and growth—often drowns out the voice of exhaustion in nineteenth- and early twentieth-century literature, and yet industrial Britain was never without an ever-present sense that it was living on borrowed time.²³ *Extraction Ecologies* tunes into this sustained minor key, this continual note of exhaustion that pervaded literature and thinking about the environment in the aftermath of industrialism. Even in print material that was written to encourage mine speculation, where the “permanent” and “inexhaustible” resources of this or that mine were vociferously puffed, there was often rhetorical slippage acknowledging that “inexhaustible” really meant “for now.” In *South African Mines* (1895–96), for example, Charles Sydney Goldmann writes of “the permanent nature of the gold-bearing deposits of the Witwatersrand to a period far beyond the life of any of those now interested” (v). A strange definition of “permanent” is at work here, where “permanent” is tied to the lifespan of current shareholders. Goldmann goes on to use the “confidence” of these shareholders as a dubious measure for the lifetime of the mine: “The confidence of capitalists in the permanency of the Witwatersrand goldfields is best illustrated by the energy with which the exploitation of its gold-bearing deposits

is either being undertaken or initiated by them, at depths which have probably never previously been attempted in the history of gold mining” (vi). Deep mines are expensive to build and were attempted only where resources closer to the surface were exhausted or otherwise unavailable and where deeper resources were lucrative enough to make deep mining profitable. Deep mining is thus no evidence for the “permanency” of the goldfield, and Goldmann goes on to further qualify his definition of “permanent”: “Though the majority of sceptical prognostics have been won over to acknowledge the wealth of these goldfields . . . there remain an incredulous section who would regard the forecasting of gold returns in the distant future as extremely hazardous and reckless. It may suffice, therefore, to review the past six months and anticipate only what is likely to occur in the near future” (viii).

Let us review: in a dizzying descent, Goldmann’s introduction passes from the timescale of “permanent,” to the timescale of the shareholder’s lifetime, to the timescale of six months. He admits that one of the central questions on the minds of prospective investors must be, “what is the life of the mine?” (xv). The question haunts *South African Mines*, as it does all the technical and economic literature of extraction in this period.²⁴ Sometimes the answer was unintentionally comic: in his rundown of the gold mines in the Witwatersrand region, Goldmann includes an entry on the “Cornucopia Gold Mining Company, Limited.” As if the discrepancy between “cornucopia” and “limited” were not jarring enough, the entry includes the crucial detail that the Cornucopia mine “has been shut down since 1891” (53).²⁵

Overseas gold mines were seen as particularly volatile speculations at risk of exhaustion, and there was precedent for viewing them as such, but within Britain the more mundane prospect of coal exhaustion reared its head frequently in Parliament, in works of political economy, in a Royal Commission devoted to the question, and in the popular press. Jevons’s *The Coal Question* is only the best-known and most comprehensive analysis within a complex of industrial-era discussions about coal exhaustion.²⁶ Discussions of metalliferous exhaustion were widespread too, as described in chapter 1. While the estimated timescales of such projected exhaustions varied, the key point to emphasize is that the timescale was understood generationally and was spoken about generationally. As Henry E. Armstrong said in a 1902 address to the British Association for the Advancement of Science, “In Great Britain we are using up our coal stores at the rate of over two hundred millions of tons per annum. Used at such a rate, the supply cannot last many generations; whence will our children derive their supplies of energy? . . . When we have squandered the wealth funded

on our earth by the sun in æons past, we must fall back on the modicum we can snatch from the daily allowance the glowing orb dispenses” (825). As this suggests, the depletion of coal, the basis of industrial society, was understood to be a danger for subsequent generations in the near-to-middle-term horizon.

The predicted exhaustion of coal was particularly vertiginous to contemplate at a moment when coal’s long process of formation and compression, originating with prehistoric plants, had only recently come to be widely understood.²⁷ How could something take so long to form and change the world so quickly, only, it seemed, to run out but a day later? Writing from the United States, but with attention to the British coal industry, P. W. Sheafer reflected in 1881, “Coal is monarch of the modern industrial world. . . . But, supreme as is this more than kingly power at the present time, comparatively brief as has been the period of its supremacy, and unlimited, in the popular apprehension, as are its apparent resources, yet already can we calculate its approximate duration and predict the end of its all-powerful but beneficent reign” (3). Sheafer expresses here the dizzying temporalities of extraction-based life, the deep timescales between the formation of coal and its extraction and use in the industrial present, and the much shorter timescales between its combustion today and its exhaustion tomorrow. His essay makes clear that Britain, who rose to industrial ascendancy on its rich resources of coal, is the nation with the most to fear from exhaustion: “There it is serious, indeed; for when Britain’s coal fields are exhausted, her inherent vitality is gone, and her world-wide supremacy is on the wane. When her coal mines are abandoned as unproductive, her other industries will shrink to a minimum, and her people become familiar with the sight of idle mills, silent factories, and deserted iron works, as cold and spectral as the ruined castles that remain from feudal times” (11).²⁸

Such predictions proved off the mark, of course, for as it turned out, there are far more hydrocarbon reserves underground than are at all good for us, and the globalization of extractive industry made local exhaustion less of a factor as capitalism expanded to encompass new natures. At the local level, however, mine exhaustion remains a critical factor in extraction-based life. Jessica Smith Rolston describes how in Wyoming’s vast twenty-first-century coal-mining operations, the pits gradually “extend farther and farther away from the mine offices to reach the coal.” Journeys from the pit to the office “take increasingly longer amount of time to complete as the mine expands” (69). In *The Road to Wigan Pier* (1937), George Orwell emphasized the same dynamic in northern British mines,

depicting mineral resource extraction as an inherently centrifugal process, endlessly exhausting, requiring ever-longer travels for the miners from the pit to the coal face: “In the beginning, of course, a mine shaft is sunk somewhere near a seam of coal. But as that seam is worked out and fresh seams are followed up, the workings get further and further from the pit bottom. If it is a mile from the pit bottom to the coal face, that is probably an average distance; three miles is a fairly normal one; there are even said to be a few mines where it is as much as five miles” (22). This gradual process of exhaustion, as I discuss in chapter 2, illuminates extractivism’s close relation to imperialism, since the resources of the colonial frontier are demanded as continual recompense for local exhaustion.

Exhaustion may not have played out in the way that Jevons and other contemporary observers expected, but my titular phrase “the long exhaustion” is meant to capture their correct intimation, incorrectly reasoned though it was, that extraction-based life is a future-depleting system. Like many literary authors of the era, these thinkers perceived the industrial era to be unsustainable, to be a spectacular but momentary boom entailing losses and liabilities for the generations to come. Climate change, not resource exhaustion, ultimately proved to be the most perilous environmental outcome of extraction-based life, and while hardly the only pitfall of an industrialized nature, it is now the most pressing one. Our present emergency cannot be said to have been predicted by industrial-era writers, but their sense that extraction-based life entailed a diminished future did prove to be correct.

This leads to the difficult question of what it has meant for us, as a linguistic community, to be immersed in a culture and literature so thoroughly saturated in extractivist thinking and its assumptions about the future. Have two hundred years of extractivist language and literature prepared us, in some way, for the crisis we now face? Or have they made environmental crisis seem inevitable, and thus encouraged complacency? These are questions to be pondered rather than answered, but they are the questions that motivate this book. In establishing the extent to which extractivism permeated literary form and genre in the first century of the industrial era, my goal is to show how culture, language, and discourse mediate environmental history and carry along the assumptions that emerge under one set of material-environmental conditions into the new stage that follows. Focusing on the twentieth and twenty-first centuries, Jennifer Wenzel and other scholars of petroculture have described how “narratives of limitless growth, premised upon access to cheap energy and inexhaustible resources, underwrite the predicaments of the present” (1).

What is less clear, however, is how narratives of resource exhaustion that pervaded literature before the rise of oil might also underwrite the predicaments of the present. Perhaps the gushing sense of surplus that greased the wheels of the twentieth century was in some sense a reaction to earlier narratives of exhaustion; a piece of comic verse written by Hilaire Belloc in 1928, toward the end of the period covered by this study, would suggest that the rise of oil was taken, at least by some, in that light:

Our civilization
Is built upon coal.
Let us chaunt in rotation
Our civilization
That lump of damnation
Without any soul,
Our civilization
Is built upon coal.

In a very few years,
It will float upon oil.
Then give three hearty cheers,
In a very few years
We shall mop up our tears
And have done with our toil.
In a very few years
It will float upon oil. (*Do We Agree?* 46)

For Belloc oil meant a release from the toil and tears of coal-based life, but for other thinkers in this period, oil seemed merely the next chapter in a longer process of petro-exhaustion. When Walter Darwent drilled the world's "first continually productive oil well" in Trinidad in 1866 (Hughes 2), he did not erase fears of exhaustion: as Sheafer wrote in 1881, "Partially successful experiments have been made to use petroleum as a substitute for coal to some extent. But is it not already evident, under the reckless prodigality of production, that this occult and mysterious supply of light, heat and color will be exhausted before the [coal], and can, at best, only temporarily retard the consumption of the latter?" (10). The looming specter of a long exhaustion, in other words, persisted into the oil era. With the transition to oil, as Siefert writes, "the exhaustibility of energy resources remain[ed] a sword of Damocles hanging over the industrial system" (203). Coal was never really superseded by oil, of course; there is more coal mined today than there was before the rise of oil. What has

happened is not a replacement, but rather, coal and oil have together accelerated petro-modernity. Many writers in the period under consideration here, however, understood oil as a temporary respite for coal exhaustion that would be ultimately subject to the same limits as other subterranean resources.²⁹

Extractive Literature and the Literature of the Anthropocene

The literary archive from the 1830s to the 1930s bears witness to industrial extraction's transformation of the world and to the rise of what Bruce Braun has called "a 'vertical' nature" (40), stretching miles below the earth's surface. The material conditions of underground extraction are such that this transformation was difficult to perceive and comprehend, but literature is one place where we see how extractivism altered human expectations, horizons, and understandings. Literature is not merely a passive register of industrial extraction's impacts, however; it was the discursive site where this transformation was mediated. As I see it, changes in discourse and narrative operate as feedback loops whereby certain forms of environmental change or infrastructural path dependency might harden as they disseminate into the symbolic realm—or might instead be challenged in that process.³⁰ Organizing structures of prose narrative thus participate in a "multivalent traffic between matter and ideas," as Wenzel puts it (3). With extraction interpenetrating discourse in this way, there is a risk that the difficulty of thinking outside extractivism becomes compounded, but literature also provides forms with which to think beyond existing conditions, and such imaginative capacities, of particular concern in chapter 3, are important resources today amid our current reckoning with ecosystem collapse, how we got here, and what to do about it.

Extraction Ecologies is, then, a study of literary form and genre, but most centrally it is a study that uses literature to understand changing dimensions of the human-natural relation. It is a study of "social natures," to use Braun's phrasing, of how "practices of *representation*—deeply cultural and historical in character" are bound up with "nature's *material* transformation" (26). While the ethical stakes of my project extend beyond human communities to encompass animals, plants, and ecological relations more broadly, my focus on industrial extraction means that social natures will be the primary focus of analysis. The particular practices of representation with which I am concerned are long narrative prose works, fictional and nonfictional, the generous scope of which suits

the exploration of durational, expansive topics such as time, space, and energy.³¹ The prose narratives on which I focus all have some thematic relevance to extraction, but the following chapters also stretch the archive of “books about mining” beyond the obvious suspects by identifying “aboutness” in setting and worldbuilding as well as in plot. With an expanded sense of how far-reaching the impacts of industrial extraction were in this period, and how pervasive was its rewriting of the social and the natural, it now seems to me that there may be very few prose works published from the 1830s to the 1930s without *some* overt thematic interest in extraction, not to mention structuring principles rooted in extractivism. Still, all the narratives on which I focus in this study have a more or less obvious connection to the winning of underground resources, whether that connection is established through plot or setting, or, as with some texts in chapter 3, through the depiction of a post-extractive society. I have chosen to focus on extraction literature in these more overt forms to offer the most direct analysis of extractivism’s impacts on literature and genre. The reverberations of industrial extraction beyond this archive of texts will, I hope, be plainer to see once we have a conceptual schema for thinking about literature and extraction ecologies—a schema that I hope to offer in this book.

A focus on extraction and literature demands a view of the natural environment as fully inclusive of the human, a perspective that recent scholarship on the Anthropocene has made increasingly familiar; my project thus rests on the premise that at least since the industrial era and probably centuries prior, there is no nature untouched by human impacts.³² As Heidi C. M. Scott writes, the Anthropocene framing acknowledges “that today’s stratigraphy is laid in the waste of industrial humans” (“Industrial” 589). Contemporary observers of the industrialization of extraction were, as we shall see, forced to much the same conclusion. Cara New Daggett calls the Victorian era the beginning of the “ideational” Anthropocene, a period of “dawning consciousness” that human-industrial impacts “might be planetary and truly catastrophic” (9). If for Charles Babbage the nineteenth-century air itself was “one vast library” of human action, for other writers the disturbed surface of the earth was the page on which the story of the human was written.³³ Troubled by thoughts of human ephemerality while searching for an African diamond mine, for example, Allan Quatermain in *King Solomon’s Mines* imagines humans’ lingering presence on the earth by way of our monuments: “man dies not whilst the world, at once his mother and his monument, remains” (165). This conception of the earth as a “monument” of the human, a bearer of the signature and

memory of the human, anticipates the Anthropocene imagination where we understand Earth to be indelibly marked by anthropogenic impacts, where we “imagine a world in which an alien geologist from the future detects in the strata of the ground evidence of the presence of humans long after we have gone extinct” (Bubandt G135). “Truly the universe is full of ghosts,” as Allan Quatermain reflects (166).

Extraction is, of course, in large part responsible for this anthropogenic signature, not only from the atmospheric residue of fossil fuel combustion, but also from other extractive pollutants including the radioactive deposits of nuclear weapons that originate in uranium mining (the signature that the Anthropocene Working Group has currently settled on as the “golden spike” marking the new era).³⁴ Fossil fuel extraction and nuclear weapons persist, too, in contemporary forms of capitalism and militarism. A focus on extraction will thus convey, I hope, that the Anthropocene concept does not entail “a turn away from the critique of sociopolitical power relations,” but rather is a tool to help widen “the focus of sociopolitical critique,” to see human power relations and struggles within a larger context of “geophysical actors” and earth systems (Davies 62). This is the larger environmental-material context within which any solutions will also need to work.

Scholars of the Anthropocene have sometimes dated its origin to the invention of the steam engine, beginning with Paul Crutzen and Eugene Stoermer’s first coining of the term in 2000, but that narrative is now contested. Some argue that technologies such as agriculture led to humans’ irreversible impact on earth systems, as extensive tracts of land were repurposed to grow grain, and others say that it was not a particular technology that spawned the blight that surrounds us but rather a set of social and economic relations such as capitalism, colonialism, or the plantation system.³⁵ Tobias Menely and Jesse Oak Taylor have discussed the Anthropocene Working Group’s debate over the timing of the human signature on the stratigraphic record and the consequences of this debate for the humanities, showing how “geologists give narrative shape to history” when they select this or that boundary event as definitional (3). Scholars of nineteenth- and early twentieth-century literature have a stake in these debates, given the primacy of our era in the arrival of fossil capitalism, but considerations of scale and acceleration should caution us against any easy link between the invention of steam power and the more than 400 parts per million of CO₂ that hang heavy in our atmosphere today. As David Wallace-Wells writes, “many perceive global warming as a sort of moral and economic debt, accumulated since the beginning of the Industrial

Revolution and now come due,” but “more than half of the carbon exhaled into the atmosphere by the burning of fossil fuels has been emitted in just the past three decades” (4). Here it may be helpful to think of steam power less as a material trace than a form, a form that has been expanding and accelerating since its inception, subject to various historical encouragements and, occasionally, historical checks. Carbon dioxide from coal burned during the Industrial Revolution still floats in our atmosphere, but it is the broader complex of extraction-based life and the forms and practices that support it that are responsible for our current impasse.³⁶

Wherever the steam engine fits into the story of the Anthropocene, and however it contributed to the rise of fossil capitalism—that ever-accelerating juggernaut of waste and productivity powered by the stored solar energy of long-dead lifeforms—none deny that the birth of steam was one of the signal events in environmental history, nor that it happened in coal-rich Britain.³⁷ But despite the prominent role of mining in the environmental and social history of Britain and its empire, and despite the recent flourishing of work on literature and the Anthropocene, our critical understanding of British literature has been inadequately attentive to the epistemology of extractivism. Amitav Ghosh argues that art and literature since the Enlightenment have developed “modes of concealment” that prevent us from recognizing the environmental catastrophes of modernity, but my study is premised on the idea that extraction does play a crucial structural role in the literature, albeit one that we have failed to observe (11).³⁸ If literary criticism has, in the main, tended to overlook how language and literature are shaped by the natural world and its transformations, my book contributes to the work of addressing this oversight. But *Extraction Ecologies* also suggests that we find a particularly influential vision of the natural world in the literature of Britain’s industrialized empire. First to transition to fossil-fueled industry, Britain was the first extraction-based society, and the literature of the British imperial world is thus in the remarkable position of originating the literature of fossil capitalism and industrial extractivism. In this role it reckons with a new vision of civilization where humans now depend on finite, nonrenewable stores of earthly resources that are incapable of replenishment through seasonal rebirth, and the threatening horizon of exhaustion works its way into narrative form. Themes of degeneration and decline have long been recognized as preoccupations of modern literature, but we have yet to connect this literary turn with the descent down the mine shaft that was a base structure of modern life.

Organization and Chapter Overview

To uncover extraction's multifaceted role in the literature of industrial and imperial Britain, I have organized *Extraction Ecologies* conceptually, with three long chapters broadly devoted to three central categories (time, space, and energy) and three corresponding literary genres (provincial realism, adventure literature, and speculative fiction). Each chapter, after presenting its overall argument, includes five subsections each focused on a particular text. For readers looking to the book with an eye for the individual case, the subsections are listed in the table of contents. Orders of time (when things happen and in what order), space (where things happen and how they move), and energy (how things happen and from what cause) transform with the rise of extraction-based life, and thus each chapter traces industrial extraction's shadow and formation in one major conceptual domain. This is admittedly an unusual structure, but it allows me to make a case for extraction ecologies as a feature of this era's literature by drawing together multiple textual examples for each major point, foregrounding the project's broad conceptual interventions and its claims about genre while still allowing for close literary analysis. The argument of *Extraction Ecologies* is not one that can be proven through long readings of a few texts; it seeks instead to showcase a pattern or trend beyond the individual case. Genre, as a category of analysis, offers something like a middle ground between close and distant reading, allowing us to see larger patterns without detaching us from the singularity and nuance of individual texts. The mobility and repeatability of literary form and genre across time also get to the problem of historicity at the heart of this study: environmental history and environmental knowledge require a long-term view, and literary genre and form carry ideas across historical periods in ways that transcend individual texts. To plumb the literary archive of the past is to find discursive and conceptual formations that have remained with us, to our detriment, as well as formations that have been left to the wayside and are worth revisiting today.

My first chapter, "Drill, Baby, Drill: Extraction Ecologies, Futurity, and the Provincial Realist Novel," demonstrates how the provincial realist novel incorporated exhaustion as a temporal structure to depict the new horizons of human life under extractivism. Provincial realism's long-standing reliance on the marriage plot and the inheritance plot, on providing closure via social reproduction, transforms against the backdrop of extractivism to withhold the promise of reproductive futurity. As the steam engine and other industrial technologies were transforming the

scale and impacts of mining in the backwaters of global empire, discourse around exhaustion, futurity, and decline reached a new stage as well, transforming the endings, trajectories, and temporalities of the provincial realist novel. All the novels discussed in chapter 1 take place in settings of extraction or exhausted extraction—sacrifice zones—and all explore the temporal structure of an extraction-based present claimed at the expense of future generations.

The chapter's first major subsection focuses on Joseph Conrad's *Nostromo* (1904), a novel that gathers a large cast of characters around an out-of-the-way silver mine in the fictional South American country of Costaguana, interweaving the story of the mine with three broken and infertile marriage plots and revealing how exhaustion's temporal features pervade the trajectory of the provincial realist novel. Next I turn to George Eliot's *The Mill on the Floss* (1860) and its key setting, the Red Deeps—an exhausted ironstone quarry where Maggie Tulliver and Philip Wakem enter a forbidden engagement that will never be consummated in marriage, just one of the novel's failures of futurity. The third major subsection considers Fanny Mayne's *Jane Rutherford: or, The Miners' Strike* (1854), a lesser-known novel that treats the conditions of working-class family life in a mining community, toggling between a strike story and a marriage plot to underscore the forms of social reproduction demanded of workers within extraction economies. Charles Dickens's *Hard Times* (1854), discussed next, is also set in a coal-mining district, but here the long-awaited marriage between workers Stephen Blackpool and Rachael never happens because of Stephen's tragic fall into an exhausted coal pit. The last major subsection of this chapter focuses on D. H. Lawrence's *Sons and Lovers* (1913), a novel that links its mine-ridden landscape with Paul Morel's difficult sexual maturity, transforming the provincial bildungsroman to conceive of individual human development in the context of extractivism's socio-environmental entanglements.

Chapter 2, "Down and Out: Adventure Narrative, Extraction, and the Resource Frontier," turns from the temporal to the spatial imaginary and from realism to adventure writing, arguing that industrial-era adventure literature exhibits a newly energized orientation toward the horizon of the resource frontier, stimulated by the constant search for new lodes that defines the extractivist age. Focusing on adventure narratives that take place in Latin America and Africa, I show that they are premised on a collapse of the vertical and the horizontal, where a journey across the earth becomes the necessary complement to downward delving into the earth. Jason Moore's *Capitalism in the Web of Life* has helped us understand the

appropriation of “cheap nature” as part of the historical tendency of capitalism, and that a restless global reach toward the frontier must accompany any notion of “free” nature. Imperial adventure narrative is a genre full of treasure hunting on the frontier, one that was born in the context of the mineral resource scrambles that dominated geopolitics in the industrial era, from the Mexican mining boom to the Californian and Australian gold rushes to the South African Mineral Revolution.

The first major subsection of chapter 2 focuses on Mary Seacole’s *Wonderful Adventures of Mrs Seacole in Many Lands* (1857), a memoir that foregrounds the epistemological challenges of frontier space as it details Seacole’s supporting role in one of the great extractive dramas of the era: she ran a hotel in Panama catering to miners heading to and from the California Gold Rush and tried her own hand at gold mining in several failed schemes. I turn next to Robert Louis Stevenson’s *Treasure Island* (1883), a fictional adventure romance that shares Seacole’s Spanish Caribbean setting and similarly foregrounds in its narrative forms the limited perspective from which extractive imperialism precedes. The third major subsection focuses on H. Rider Haggard’s *Montezuma’s Daughter* (1893), a historical adventure novel about the Spanish quest for gold in the Americas, which strives to justify Britain’s extractive ascendancy in Latin America after the decline of Spanish and Portuguese rule. Turning next to adventure narratives set in Africa, I show how Haggard’s *King Solomon’s Mines* (1885) offers a vision of colonial extraction and mineral wealth waiting to be won on a rich frontier in a narrative structure that codifies the extractivist worldview. Finally, I look to Joseph Conrad’s *Heart of Darkness* (1899), a novel about fossil ivory in the era of fossil capital, which merits inclusion for the iconic manner in which it folds the imperial extraction plot into its experimental narrative forms.

My third and final chapter, “Worldbuilding Meets Terraforming: Energy, Extraction, and Speculative Fiction,” addresses the energy imaginary within the industrial extraction boom and how this imaginary shaped the political and social projections of speculative literature. Speculative genres such as hollow earth fiction, utopian fiction, and fantasy fiction burgeoned alongside industrial extraction, and my chapter focuses on the ruminations on energy and exhaustion that grounded these literary speculations. Extractive energy supplied the material conditions from which speculative fiction takes flight, but these worldbuilding genres also offer imaginative resources for envisioning energy beyond extractivism, even as they narrate, through their secondary worlds, energy’s determinative role in culture, environment, and society.

The first major subsection of this chapter focuses on Edward Bulwer Lytton's *The Coming Race* (1871), a hollow earth novel that begins when the protagonist is exploring an underground mine and falls into the world of the Vril-ya, a subterranean civilization built around a mysterious energy source, vril. Next I turn to Rokeya Sakhawat Hossain's "Sultana's Dream" (1905), a feminist energy utopia originally published in the *Indian Ladies' Magazine* that depicts a world fueled by extraction-less solar power and utterly transformed gender relations. William Morris's utopia *News from Nowhere* (1890), the subject of my third major subsection, likewise imagines a social evolution away from extractive energy, with capitalism and the human-environment relation, rather than gender, depicted here as the primary social vectors of extractivism. From Morris I turn to H. G. Wells's *The Time Machine* (1895), which, like *The Coming Race*, features a subterranean society, in this case inhabited by the evolutionary victims of extraction ecology. Finally, J.R.R. Tolkien's *The Hobbit* (1937) depicts a quest for underground treasure that brings to speculative fiction's subsurface settings and chthonic character types the new energy agencies of the early nuclear age. *Extraction Ecologies* then offers a brief conclusion, reflecting on the question of how extractive literature of the past can helpfully intersect with environmental politics and thought today.

Sacrifice Zones and the Settings of Extractivism

As the above chapter summaries suggest, the narratives on which this volume focuses vary significantly in terms of reputation, regard, and canonicity. We begin with *Nostramo*, perhaps Conrad's most complex and difficult novel, and end with *The Hobbit*, a fantasy novel written for children; along the way, we analyze underdiscussed writings by women of color (Seacole and Rokeya Sakhawat Hossain) alongside popular romances by imperialist writers like Haggard. What all these various works share are features of setting expressed through narrative form: they are set in spaces of extraction or exhaustion, or in a post-extractive future, and such settings foreground especially clearly the extractivist elements of the works' formal and generic structures. The three primary genres with which I am concerned—provincial realism, adventure narrative, and speculative fiction—are all expressly setting dependent. Provincial realism draws its sense of place from its out-of-the-way-ness; adventure narrative features a journey into the frontier, or sometimes beyond the frontier; and speculative fiction's imaginative worldbuilding creates new settings in an alternative reality. Mining communities, resource frontiers, imaginary worlds with new

energy formations: the extractivist currents of these narrative genres are particularly noticeable because of these settings, even though extractivist forms can also be said to pervade industrial-era literature more generally.

The key role of setting in *Extraction Ecologies* suggests the logic through which I have chosen my central texts and why I have approached them conceptually via genre. Extractivism produced new genres and transformed old genres as literature intersected with industrialism and its impacts on the natural world. Elizabeth Chang, in her recent study of plants and the global nineteenth century, has argued, relatedly, that the landscape of empire “was becoming increasingly nontransparent in its infrastructure” (*Novel* 18), which necessitated the rise of detective fiction, a genre where the setting steps forward from a stable narrative background to become interpretable. Setting is, for obvious reasons, a primary focus of much ecocritical work, and recent ecocriticism has challenged us to theorize setting more robustly.³⁹ Still, my ambition for this book is that the overall argument will prove portable beyond novels with explicitly extractive settings. In the following chapters I aim to expand notions of what qualifies as an extractive setting and to test the flexibility of that category within industrial-era literature. Even novels that might not initially seem to be about extraction, such as *The Mill on the Floss* or *News from Nowhere*, emerge as extractive literature when placed in the context of environmental history and considered from the standpoint of genre. By drawing together works that are quite obviously about mines and underground treasure, such as *Nostromo* and *King Solomon’s Mines*, with other less obvious examples, I hope to illustrate the breadth of extractive literature as a category.

Setting references time as well as place, and insofar as we are still living in the world that industrial extraction created, these settings of the past continue to persist. Some would argue that a book about industrial-era extraction ecologies is necessarily presentist since it attends to, and is designed to attend to, the environmental crises of today, especially global warming and its roots in the coal-fired capitalism of the British Empire. Debates about presentism and strategic presentism have now occupied literary studies for some time, but what I aim to practice in this book is, rather, a methodology capable of working on multiple timescales.⁴⁰ Thinking about the literature of underground resource extraction in the first century of the industrial era, we can imagine at least four temporal frames in which to position these texts: a deep timescale in which coal, diamonds, and other extractable commodities took form over long stretches of geological change; a fragile nineteenth- and early twentieth-century present in

which such commodities were understood to be abundant, though physically resistant and labor intensive to acquire; an imagined future of depletion in which, it was thought, extractable commodities would eventually be exhausted; or the actual future we live in now, an era of anthropogenic climate change and other toxic remainders that can be linked back to the historical rise of large-scale extractive industry. Reading extraction-based literature with an eye for all these temporal registers, the following chapters ask whether intimations of our present exist in literatures of the past, whether intimations of future decarbonization exist in literature of the past or our readings of it today, and whether the environmental imagination of the past can reveal possible futures, roads not taken, that we can learn from in our present impasse. Ultimately, we can make sense of form and setting only in durational terms, as products of history, and neither form nor setting can truly be said to mean anything outside of history, and yet “historicism” is often discussed as though it were a more temporally static method than it actually is. What I aim to practice in this book is a heterotemporal historicism that is sensitive to the multiple, nested time lines of environmental change and environmental devastation across this long era of exhaustion in which we yet remain.

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