Introduction

Timescapes of Extraction

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Prelude

In 1982, Eric R. Wolf published his magnum opus *Europe and the People Without History*. This long-length book included 'cartographic illustrations' selected by Noël L. Diaz. Two copper engravings by the sixteenth-century Dutch engraver and publisher Theodore de Bry open the first two parts of the book ('Connections' and 'In Search of Wealth'). The second of these two engravings is titled 'Washing gold' (Wolf 1997 [1982]: 126–27). To the right, half-naked men dig the gallery of a gold mine with picks, while other men – we glimpse them in the darkness – are timbering the galleries. Still others run with buckets of gold on their heads, and some tip gold at the foot of a finely-dressed European lord, who is sat in a chair. He holds a rod and is surrounded by men with spears and swords. Far distant, other armed men oversee the mining activities.

The engraver Theodore de Bry (1528–1598) was well-known for his illustrations of the European colonization of the Americas and the imaginative representations of Amerindian populations, even though he had never seen them first hand, relying on second-hand descriptions, such as travel accounts and reports by those who had been to the Americas and saw the 'new' lands (Van Groesen 2019).[1] To represent gold mining, Theodore de Bry most likely resorted to his knowledge of mining activities in Europe. In 1525 it was reported that the European metallurgical sector employed a

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massive 'one hundred thousand workers' (Moore 2007: 127). Likely, the bodies and toiling of mineworkers in Europe could have served as a model to depict the exploitation of indigenous and enslaved African labourers. As Europe was flooded with the silver extracted in the Americas, 'tripling the European supply' between 1503 and 1660 (Wolf 1997 [1982]: 139), silver mines on the old continent were exposed to increased competition, which eventually led to reduced extraction and therefore a reduced workforce (Komlosy 2018: 126). To supply Europe with American silver, mineworkers were largely replaced with the cheap labour of Amerindian communities and by enslaved labourers traded from the West African coast across the Atlantic.

Theodore de Bry's engraving captures a meaningful moment at the dawn of modern capitalist globalization. The European conquest and plunder of the Americas ushered in a new era of predatory extraction, employing exploitation and violence on an unprecedented scale. Mining laid the foundations for a transatlantic system of wealth accumulation through the violent dispossession of the Amerindian peoples and the environment. On the eve of colonial conquest, the rapid expansion of mining in Europe sparked major peasant uprisings in response to the enclosure of communal forests and the environmental destruction of livelihood means (Moore 2007). From the outset, the modern world system was built on the sustained expansion of extractive activities, on new logics of labour and nature exploitation that paved the way for the rise of a new regime of socioecological relations (Machado Aráoz 2018 [2014]; Moore 2007, 2015).

Five centuries after De Bry had visually imagined gold mining in the Americas, resource extraction has grown dramatically, providing the indispensable raw materials to produce every kind of commodity that pervades our daily lives; as Jacka (2018: 62) puts it, 'our entire livelihoods are utterly dependent on minerals'.[2] For at least two centuries now, resource extraction has profoundly altered entire ecosystems and ways of life, generating lasting pollution problems that are increasingly difficult to manage (Bridge 2004; Jacka 2018: 66–68). Resource extraction has also changed and shaped distinctive minescapes and social identities, through the ways of mobilizing and organizing labour. The expansive and pervasive nature of resource extraction is now also reflected in the growing literature on mining. Since the beginning of the new millennium, interdisciplinary research on resource extraction has literally boomed.[3] This emerging field of study brings together the work of anthropologists,

critical geographers, archaeologists, sociologists and environmental historians (at least since the work of Knapp, Pigott and Herbert 1998). Different sensibilities contribute to making the study of resource extraction a truly interdisciplinary field that fruitfully intersects with other similar interdisciplinary endeavours, from deindustrialization studies to political ecology.

This book aims to contribute to this growing literature by putting together mining and post-mining in a global perspective; that is, by approaching the spatial and temporal articulations of mining and post-mining as interrelated and coexisting features of the same global minescape. The main point we want to make is that placing mining and post-mining in a global perspective helps us account for the interconnections between the diverse and diversified worlds of resource extraction and their lasting effects over time, and to think about their legacies as intimately connected to the contemporary extractive geographies. To do this, we propose framing mining and post-mining sites through the idea of the 'global life of mines', which we conceive as a methodological framework for addressing the variations and permanence of resource extraction and its aftermath. Taken together, the chapters in this book offer insights into the multiple temporalities entangled in the timescapes of resource extraction (D'Angelo and Pijpers 2018a, 2018b) and how such temporalities, far from being captured by conventional linear chronologies (of clocks, calendars, calculations, estimates), coexist and interact in producing the global minescape. Thinking about mining and post-mining in terms of their 'global life' means to combine the spatialities of dispersed sites of (post)extraction with a timescape perspective that highlights the temporal intricacy and multifaceted temporal dimensions of socio-environmental life (Adam 1998). Consequently, the 'global life of mines' entails understanding extractive spaces through time and the temporalities of extraction through space.

This book brings into conversation researchers who address different dimensions, implications and temporalities of resource extraction and its aftermath.[4] In this Introduction, we highlight a 'global' outlook as a productive way of thinking about extractive activities and their afterlives. We clarify the meaning of the global, what is global in the life of mines, and how we believe it is crucial to bring together mining and post-mining in a comparative perspective. We think of the global life of mines as a comprehensive framework for thinking about circuits of extraction, mining sites and their exhausted landscapes as intimately interconnected.

Timescapes of Extraction

The debate on the Anthropocene as a proper term to identify a new geological epoch, characterized by the growing impact of human activities on earth (Crutzen and Störmer 2000), stimulated the proliferation of alternative or complementary characterizations with the suffix 'cene': from Capitalocene to Plantationocene, from Chthulucene to Plasticocene, Wasteocene, etc.[5] Whatever term we may opt for (and we may even opt for more than one or all at once), we cannot escape the fact that we are living – more than ever – in 'the mineral age' (Jacka 2018). In recent decades, mineral extraction has reached an unprecedented scale and intensity – and it is expected to grow further. The expanding electric vehicle industry, 'clean' energy technologies (from wind turbines to solar panels) and the widespread digital technologies are devouring increasingly enormous quantities of minerals (Geenen, this book). A report by the International Energy Agency shows how mineral-intensive these technologies are, compared to fossil fuel technologies: 'A typical electric car requires six times the mineral inputs of a conventional car', while 'an onshore wind plant requires nine times more mineral resources than a gas-fired plant of the same capacity' (IEA 2021). Considering this ratio, the IEA estimates that reaching the goals of the Paris Agreement by 2040 (that is, to limit global warming to below 2 degrees Celsius) would require four times the current mineral supply for 'clean' energy technologies. The increasing demand for minerals is especially noteworthy for lithium and graphite, truly 'timely assets' (Ferry and Limbert 2008).[6] According to the World Bank (2020), to meet the goals of the Paris Agreement by 2050, 'production would need to ramp up by nearly 500 percent'.

The mineral boom was already on its way at the end of the last century (Ballard and Banks 2003). Over the last fifty years, the 'global annual volume of extracted materials has tripled' (D'Angelo and Pijpers 2022b: 2). The new millennium has seen an impressive expansion of extractive activities, largely due to the liberalization of the mining sector in developing countries (Jacka 2018: 63) – a crucial factor in post-Cold War neoliberal worldwide deregulation (Kirsch 2014). African countries witnessed an unprecedented rise in foreign investments in the extractive sector – a fact that contributed to the expansion of a flexible workforce in the mining industry (Rubbers 2021). Regions targeted for centuries by European extractivist exploitation started to pursue neo-extractivist policies by attracting corporate investments and making the mining sector a pillar of

export-oriented growth policies (Arboleda 2020).[7] Latin American countries – like Bolivia (Ødegaard, this book) – have been trying to recast mining activities as a key driver for the development of a nationally-owned industry (Barandiarán 2019; Revette 2016). In 2008 the European Union launched the Raw Materials Initiative (RMI), intending to support new mining projects in Europe. The worldwide bustling expansion of mineral extraction is also marked by an incredible variation regarding types of mining operations, technological levels and managing patterns and work relations, ranging from technologically advanced industrial large-scale mining (ILM) to the myriad of artisanal and small-scale mining (ASM) operations. We are thus witnessing something very old and, at the same time, something novel, for its scale, extension and impact. Extractive activities have been around as long as human civilizations. The early days of capitalist development have seen the rapid expansion of profit-seeking extractive activities. Colonialism triggered the formation of modern extractive geographies and racialized labour forces, while the take-off of industrial capitalism in the nineteenth century generated a growing demand for coal and minerals (lead and zinc, for instance).

The making of new frontiers of extraction has often entailed the demise of existing ones, thus leaving behind derelict and exhausted extractive landscapes (Calvão 2011; Oakley 2018). As early as the sixteenth century, the abundant inflow of silver and other minerals from the Americas badly affected European mining regions. The latter expanded again in the nineteenth century, shaping a combative and iconic labour force, frequently racialized and demonized, such as in rapidly industrializing Britain (Metcalfe 1990; Mitchell 2013: 21–42; Thompson 1963). The decline of the European mining industry,[8] beginning in the 1960s, was paralleled by the rapid expansion of the mining industry across the African continent, far beyond the one already established in the Copperbelt (Powdermaker 1962).[9] Since the 1960s, other resource frontiers have emerged, increasingly targeted by the unbridled circulation of capital – such as Papua New Guinea[10] or other areas of Southeast Asia (Ballard and Banks 2003).

The making of resource frontiers is one of the connecting threads between the chapters in this book, which examine the constant dialectic between waste and value (Gidwani 2012, 2013), emphasizing the colonial legacies of capitalist appropriation of devalued ('cheap', following Moore 2015; Patel and Moore 2018) nature and of socioecological dispossession. Resource-rich territories are therefore appropriated through the 'discovery paradigm' (Burton 1997; Kirsch 2014) as 'virgin land' (White, this book), 'terra nullius' (Mesbah, this book)

or through the narratives of valorization and economic development of 'unused' (hence wasted) resources (Buu-Sao, this book). The concept of 'resource frontier' lies at the intersection between temporal and spatial scales (Jacka 2018; Tsing 2005: 28); while it is a central concept to think about how regions are turned into territories of extraction, and about the powerful boundary work of resource-making processes (Ferry and Limbert 2008), it is also relevant to explore how post-mining areas are being re-envisioned as new frontiers. As shown by Ødegaard (this book), the Norwegian state-led project of 'restoring to nature' the coal mining Arctic Svalbard archipelago mobilizes the narrative of a post-carbon socio-environmental future to turn a resource frontier into 'nature's frontier'; a shift that toys with visions of new subjects for a new era, from which coal miners are excluded as relics of a bygone age. Buu-Sao (this book) examines how corporate powers mobilize the narrative of sustainable mining (a 'corporate oxymoron' analysed by Kirsch 2010) to re-create the post-mining Andalusian region as a brand new technological frontier of resource extraction. Such operations rely on the 'strategic mobilization of temporal frames' and the 'historical amnesia' of the mining past (Luning 2012).

The Lives and Afterlives of Extraction

As we acknowledge the relevance and impact of mining activities in modern capitalist development, we can also think about the afterlives of extraction as the disseminated geographies of capitalist dissipation, depletion and exhaustion; and as lasting marks of socio-environmental change and capital's temporal alienation.[11] As more areas of the world are being turned into new resource frontiers, older mining regions are burdened with the long-standing problematic socio-environmental legacies of resource extraction and mineral processing. Few human activities move more volumes of earth than mining. Mining can profoundly alter the morphology and hydrology of extensive territories, affecting the flora and fauna as well as subsistence practices and the sociocultural maps of indigenous life. Mineral processing technologies – even the most rudimental – make use of chemicals (mercury, cyanide etc) that spill into creeks and rivers, causing the contamination of soils and waters (Bridge 2004; Mesbah, this book). The environmental impact of mining activities – especially large-scale industrial extraction – is not only lasting but also extremely costly, either in terms of remediation or in terms of

any necessary measures to limit further damages, such as infrastructure or dams to prevent spillover from highly contaminated drainage areas. Such costs are hardly borne by the mining companies that are responsible for them. The socio-environmental costs of mining are externalities that do not count in production costs; they are passed on to the population and public authorities, often leading to exhausting negotiation processes for obtaining compensation. For instance, in the United States it has been estimated that 'more than 156 abandoned hard rock mining sites have been targeted for federal clean up, an intervention that will cost the US government an estimated $15 billion, more than ten times the annual Superfund budget for all environmental disasters' (Kirsch 2014: 4).

Post-mining regions have also to face the socio-economic consequences of mine closures. Unemployment and economic downturn are the most immediate and pressing concerns, often resulting in the depopulation of entire areas and the fragmentation of formerly cohesive communities, turning them into spectral memories of the past (Kideckel 2018). Similarly, post-mining regions may suffer from cultural disorientation, resulting from perceptions of disposability and the severe crisis of working-class cultures (Strangleman, Rhodes and Linkon 2013). When this happens, it can take a long time to deal with the afterlives of mining activities, in terms of finding ways and means to tackle job losses and socio-environmental degradation and also negotiate proper compensatory agreements, or pursue meaningful collective memories of the past. The case analysed by Zanini (this book) reveals the historical othering of mineworkers within Alpine communities and how othering persists in the friction over the preservation of mining memories. Following the closure of goldmines in the 1960s, mineworkers migrated overseas (e.g. to Uganda) to seek employment in the mining sectors; meanwhile, both the centuries-old mining history and the painful memory of miners' toil were marginalized in the touristic reinvention of the traditional mountain community. Other times, the aftermath of mining activities can be so dire and hard (and costly) to come to terms with that the continuing 'slow violence' (Nixon 2011) of these legacies is ignored, intersecting with other forms of racial and social oppression, compounding the devaluation of indigenous and minority populations, stigmatized as worthless (Mesbah, this book; White, this book). The post-mining transition in the Svalbard archipelago, reimagined by the state as a laboratory of environmental restoration, displaces 'the miner' from the new narrative of post-extraction; mineworkers come to represent the negative temporal other of the

new domain 're-created as a post-extractivist and environmentalist showcase' (Ødegaard, this book). In the mining revival of the Andalusian wastelands, the historical figure of the mineworker is overshadowed by the narrative of technologically advanced and sustainable mining operations, smart jobs and highly skilled technicians (Buu-Sao, this book; see Lanzano 2022). The long political history of Andalusian mineworkers has been monumentalized as a thing of the past. All these diversified histories of dispossession make up the uneven geography of mining and post-mining.

Operating mines and abandoned wastelands are connected through the same logic of accumulation and profitability; as such, they can be viewed as spatial reflections of the multiple (and stratified) temporalities of capital (Tomba 2009). By bringing mining and post-mining together we are also putting into conversation spatial and temporal notions of resource extraction, old mining sites and new territories of extraction (Luning 2018: 281–82). As previously emphasized, the global life of mines is as much about time as it is about space. Recent anthropological scholarship has provided insightful approaches to untangling the multiple mining temporalities (D'Angelo and Pijpers 2018b). Drawing on fieldwork on artisanal gold mining in Sierra Leone, Engwicht (2018) underlines the significant role of miners' concept of the future and their expectations for a better life, while the work of Askland (2018) in the coal mine region of New South Wales, Australia, approaches the temporality of mining through the lens of (im)mobility, showing how mining-induced displacement parallels involuntary immobility, producing what she calls 'broken time'. While mining projects polarize labour spatial mobility (Castillo and Brereton 2018), the closure or abandonment of mining sites highlights specific temporal strategies and dimensions, as shown by Oakley (2018) in a comparative analysis of several mining sites transformed into heritage, tourist destinations. Similarly, the chapters in this book focus on specific dimensions of the temporalities embedded in the end or suspension of extractive activities – and their legacies. It is not only about the afterlives of resource extraction – its continuing and long-standing consequences – but also about the history of resource extraction as a persistent and indelible presence. The authors explore the multiple forms and shapes of this absent presence – from the tragic and deadly embodiment of uranium mining (Mesbah, this book) to the reimagination of mining as a contested heritage (De Souza Santos; Zanini, this book); from the haunting spirits of dead enslaved labourers in the Brazilian gold mines (De Souza Santos, this book)

to the silenced histories of evicted Timbisha Shoshone families in California's Death Valley (White, this book). The book contributes to the current burgeoning debates on resource extraction by proposing a possible framework for thinking about the temporality of resource extraction as already intimately connected with its afterlives, its consequences and legacies. The chapters show how resource extraction already contains the problematic temporality and materiality of its afterlives. In fact, both concepts – 'resource' and 'materiality' – need to be understood and refined on the ground, according to specific mining and post-mining timescapes. Theorizing how resources are entangled with experiences and politics of time, Ferry and Limbert (2008) unpacked the conventional notion of 'resources' and explored how practices of resource-making and resource-claiming are made and – at the same time – produce temporal imaginings (see Buu-Sao; Ødegaard, this book). In this vein, comparing how water and oil refer to different historical or fictional narratives in Oman, Limbert (2016) reveals how certain natural resources might embody or incorporate specific events, processes and temporal dimensions, disclosing certain environmental futures (see Mesbah, this book). However, as Limbert suggests, the meaning, management and use of 'natural' resources from the soil is never given but always subject to negotiations (that is, socially and politically constructed), as they represent a source of tension and potential conflict, revealing unequal distribution of wealth, power disparities and even different ontologies. From this perspective, the conventional idea and the concept of 'materiality' itself should not be taken for granted. Actually, the materiality of resources also has a relational character within specific socio-historical environments in which they are generated and transformed, within and beyond the capitalist market (Richardson and Weszkalnys 2014). Nevertheless, the environmental history of modern resource extraction is a history of continuing and persistent human displacement and socioecological degradation (Bridge 2004; Kirsch 2010; Mesbah, this book; White, this book).

Global Minescapes

There is little doubt that 'resource extraction is more than ever a global, planetary affair' (D'Angelo and Pijpers 2022b: 2). Yet, at the beginning of the twentieth century, Ballard and Banks (2003: 287) pointed to the paradox of studies being 'persistently parochial and regional in their scope' in spite of 'the transnational nature'

of the mining industry. Their benchmark reference was Godoy's previous overview of the anthropology of mining, which relied on a relatively limited number of studies (Godoy 1985). Decades of profound transformation separate Godoy's in-depth review from the one by Ballard and Banks. Neoliberalism thrived with the emblematic defeat of British mineworkers by Margaret Thatcher. Deindustrialization advanced steadily in Western countries (High 2021). Industrialization flourished in Asia, with China developing a peculiar model of socialist-minded capitalism. The former African colonies – now formally independent states – were struggling with overwhelming debt from World Bank development loans. The collapse of the Soviet bloc marked a significant global event. The three-worlds division gave way to the ambiguous dichotomy between the Global North and the Global South. The globalized world was undergoing profound changes. Ballard and Banks wrote amidst burgeoning discourses of globalization that emphasized the transnational flows and networks of a borderless world, unified by the proliferation of information technologies. However, despite the sense of immateriality conveyed by the enthusiastic hailing of the rising digital world, none of this would have been possible without the thousands of workers digging craters, scraping away soil and operating sophisticated technologies to extract mineral wealth from the depths of the earth.

The idea of connection and interrelation is inherent in the very meaning of the word global, at least in the ways it has been widely used in a variety of domains since the late twentieth century (e.g. Conrad 2016; Tsing 2005; Van der Linden 2008). The idea of interconnection is so powerful that 'disconnection' has been theorized as the unsettling consequence of modern deindustrialization (Ferguson 1999; Vaccaro, Harper and Murray 2017). The inherent connectedness of the 'global' underlies the emergence of new geopolitical categories. The Global South, for instance, is not a simple substitutive term for former Third World nations, but it entails the proactivity of those countries (or some of them) as an interrelated whole in the face of the Global North (Kalb and Steur 2015). Theorizations of a 'global ethnography' (Burawoy et al. 2000) point to the connections between micro-practices and macro-structures, rethinking research outlooks on multiscalar terms, to grasp the threads connecting specific locales to wider processes. Likewise, the exploration of ethnographic locales becomes 'an ethnography of global connections' (Tsing 2005). Two decades earlier, Wolf (1997 [1982]: 3) made the central assertion that 'the world of humankind constitutes a manifold, a totality of

interconnected processes', emphasizing the challenge of explaining such connections rather than merely describing them, and how these coexist as an expression of the field of forces shaping the more conventionally understood 'ethnographic site'.

While the global perspective can offer valuable insight into the connectedness of disparate geographies and stories of resource extraction, it is important to discuss its relevance alongside two other fundamental perspectives that emphasize the interconnection of historical and ecological processes. One is the world-system perspective, and the other is the planetary perspective. Immanuel Wallerstein's (1974) world-system theory represents the main theoretical contribution to the theorization of the systemic interconnection of historical processes since the worldwide expansion of historical capitalism in the sixteenth century. The world-system consists of the relations between the core, the semi-periphery and the periphery in the spatial organization of capital accumulation. The historical definition of these geographies of asymmetrical relations in the making of the modern world has undergone shifts and changes, without substantially altering the polarization between core regions accumulating surplus extracted from the peripheries.[12] The world-system theory provides a comprehensive explanation of the uneven geographies of labour and wealth accumulation. Despite its ability to provide a framework for understanding large-scale structural mechanisms, it falls short when it comes to accounting for the specific spatial and historical differences in centre-periphery relations (Wolf 1997 [1982]: 23). Methodologically, we need to turn to a global perspective to consider these variations as part of a wider historical process, without relinquishing the differences and variations that ethnographic investigations can bring up and disclose. The global perspective can therefore be understood as a methodological sensibility to make sense of variations and differences in the unfolding of world-system relations. Adopting a global perspective to look at the ethnographies and geographies of resource extraction and post-extraction gathered in this book, we aim at tracing their stories and forms of connection to (and 'disconnection' from) larger historical dynamics at work in the production of diversified minescapes.

The planetary perspective has recently been advocated as a more appropriate approach for thinking about the contemporary dimension of resource extraction (Arboleda 2020; Labban 2014). Labban (2014) suggests that mining 'should be considered planetary in scale' and detached from the territorial constraints of traditional mining – constraints dictated by the localization of metal ores. The planetary

mine is therefore to be understood as the full-scale extension of metal extraction through the combination of hyper-sophisticated technologies that make it possible to extract metal from waste – regardless of their location. As such, the contemporary geographies and infrastructures of extraction are 'vastly dispersed across space' and entangled in a global apparatus of production and exchange, in ways that supersede the conventional world-system view of core-periphery relations (Arboleda 2020: 5).

Following labour historian Van der Linden (2012), it is worth noting that a global perspective may not always entail a theorization of the global systemic interconnection of phenomena, nor does it evade the problematic relevance of resource extraction in its planetary dimension, the intricate networked circuits of capital, or the overall alterations of earthly ecological systems. Putting things in a global perspective means thinking about localized phenomena through the lens of broader multiscalar processes. As a methodological posture, the global perspective assumes that we can better understand and explain localized histories by thinking about them as always connected to larger processes, hence as always and constitutively *global* (see Clarence-Smith 2015; Kalb and Tak 2006; Tsing 2000). Minescapes, in fact, provide peculiar examples of 'classic enclave economies that are, at one and the same moment, both deeply integrated into the global economy and also fragmented from the national space' (Bridge 2009; see also Arboleda 2020). This entails having in mind that broader analytical scales are necessary to understand how localized extractive histories are variously integrated into the broader global minescape, and how spatially dispersed histories and their diversified temporalities are synchronized in the broader global timescapes of extraction. Far from assuming the global perspective as a deterministic and mechanical explanation of localized geographies of extraction, we emphasize how variations in the spatial and temporal configuration of these geographies are intimately related to broader historical patterns of resource extraction and accumulation, natural depletion and socio-environmental degradation.

Connecting the Dots

This book originates from an event held at the University of Cagliari in November 2019.[13] Only some of the papers presented at the event were finalized as book chapters. The book includes scholars with different backgrounds, from anthropology to geography, from sociology

to political science. Despite the 'global' ambitions of the book, the geographical reach of the case studies is limited to Africa (Democratic Republic of Congo), the Americas (Brazil, Bolivia, Peru, USA) and Europe (the Italian Alps, Arctic Norway and Spain), thus leaving outside the important mining regions of Asia and Australia. There is no apology for this geographical limitation, which we acknowledge as relevant. At the same time, we never thought of this limitation as something that would undermine the overall objective of the book. Indeed, we did not intend the 'global life of mines' as a comprehensive overview of mining and post-mining cases and typologies worldwide. Rather, our primary objective was to provide insights into resource extraction and its afterlives as concomitant, varying, coexisting and interrelated processes. The chapters offer a thought-provoking range of case studies to think about the multiple articulations of the timescapes of extraction within the global minescape. A common theme throughout these chapters is the insightful examination of the temporal dimension of mining and post-mining, their interconnectedness and lasting impact on global socioecological relations.

The chapters address contemporary issues in mining and post-mining regions; from the long-standing lethal consequences of uranium mining in US New Mexico (and beyond; Mesbah) to the contradictory entailments of mining-led urbanization in Kolwezi (Democratic Republic of Congo; Geenen) and the contested imaginaries of fossil modernities flowing through fuel smuggling practices between Peru and Bolivia (Ødegaard); from the state reimagination of coal mining regions in the Arctic Svalbard archipelago (Ødegaard) and the remining of old historical sites in Europe (Buu-Sao) to the grassroots and marginal pursuit of post-mining memories in Brazil (De Souza Santos); from contentious memories of mining in the 'touristified' Italian Alps (Zanini) to the erasure of Native history in the heritage conservation practices of abandoned mining sites in California's Death Valley (White).

Most of the cases either show the historical extent of extractive activities or illuminate their enduring effects. De Souza Santos details how the guided tours in the former goldmines in Ouro Preto (Brazil) recount stories of slavery, enacted through the spiritual manifestation of the dead enslaved mineworkers. These stories of dispossession are narrated by the racialized descendants of the enslaved inhabitants, who constituted around 80 per cent of the population during the eighteenth century, when mining peaked. Buu-Sao examines the case of the Riotinto mine in Andalusia, Spain, which is one of the oldest mining sites in the world. Extraction halted in the early 2000s, when

the mine was declared a cultural heritage site, but resumed in 2015 as part of the ongoing European mining revival. Since then, extraction has coexisted with heritage processes, offering a distinct illustration of the entanglement of different mining temporalities. White demonstrates how boom and bust cycles in the making of the Western American frontier in the eighteenth century aligned with cycles of land dispossession and displacement of native populations. Mineral extraction was also a long-standing, centuries-old activity in the Alps, until its ultimate decline in the 1960s as part of the wider downturn of mining in Europe. The closures of European mines coincided with the mining boom in Africa, which attracted numerous Italian miners – as evidenced by Zanini in her chapter on Macugnaga. Geenen describes how the extractive activities in Kolwezi (Democratic Republic of the Congo), one of the main sites of cobalt extraction, are undermining the urban configuration that was precariously built on the mineral ore during the twentieth century. Cobalt is an essential component for the production of electric batteries, which has led to a significant increase in market demand. Uranium mining in New Mexico (USA) has a relatively brief history, beginning in the mid-twentieth century. However, the mining industry has created dramatic problems of radioactive contamination and environmental pollution. In 1979, a waste-filled earthen dam at the Church Rock uranium mine released more radiation than the Three Mile Island nuclear power plant accident in the same year. Mesbah details the networks of struggle and care that unfold in response to the long-lasting effects of radiation, reflecting on the temporal disjunctures of the timescapes of extraction, shaped by the logics of racial capitalism and the endurance of alternative socioecological visions.

In his perceptive and imaginative Afterword, David Kideckel comments on and expands the content of the book chapters in order to figure out new future research directions on mining and post-mining in our fevered, Anthropocenic world scenario. As he convincingly argues, there are at least three wide research areas in which anthropologists and other scholars might fruitfully engage with global mining and post-mining: the planetary, physical changes and the bodily human modifications related to mining and climate change; the sociopolitical implications associated with mining operations worldwide; and the growing significance of narrative and heritage in the mining sector (Kideckel, this book). These and other important aspects are consistent with and nicely integrate Jacka's identification of materiality, gender and remote mining as three significant areas of future mining research (Jacka 2018: 70).

In conclusion, with this book we intend to offer a framework and a number of significant examples of how theoretically and ethnographically to explore new and old mining and post-mining sites and operations and their uneven articulations (i.e. their social, cultural and political life) in a global context. The perspectives developed and the chapters assembled in this endeavour show how insightful it can be to bring mining and post-mining research into conversation, highlighting connections, disconnections and disjunctions. Consequently, we imagine the timescapes of extractions in wider spatial contexts, across a vast array of countries and continents, well beyond mining and post-mining as isolated sites and locations. Inspired by the seminal work of Eric Wolf (1997 [1982]), we propose to look at the world of mining and post-mining 'as a whole, a totality, a system, instead of as a sum of self-contained' mines and locations. Accordingly, we suggest reflecting on and exploring 'how this totality developed over time' and how each site and location is finally 'inextricably involved with other aggregates near and far, in weblike, netlike connections' at a global, planetary level (ibid., 385).

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Notes

1. The engravings of the America series began to be published in 1590 by Theodore de Bry and his sons. The complete collection of plates was recently released by the German publisher Taschen (Van Groesen 2019). The engraving 'Washing gold' in Wolf's book corresponds to the first plate of the fifth volume of the series, which depicts the Spanish conquest of the Caribbean. The volume was published in 1595 and was based on *Historia del Mondo Nuovo* (1565), the account of the Milanese traveller Girolamo Benzoni. The original description of the plate was: 'African slaves are sent to the islands by the Spaniards to search for gold' (Van Groesen 2019: 230).
2. In this Introduction, we almost exclusively refer to mineral extraction. Likewise, nearly all chapters examine cases of mineral extraction (gold, copper, uranium, cobalt etc.), except for Ødegaard's chapter, which focuses on coal mining and fuel smuggling.
3. A good indication of this proliferation of studies on mining is the interdisciplinary journal *The Extractive Industries and Societies*, launched in 2014. For an exhaustive overview, in anthropology and beyond, see D'Angelo and Pijpers (2022a).
4 Calvão, Archer and Benya (2023a, 2023b) published two edited volumes that address separately the 'lives' and 'afterlives' of extraction.
5. For a brief and concise summary of the first three terms see, Haraway (2015); on the Wasteocene, see Armiero (2021); Plasticocene does not seem to have found a consistent theoretical elaboration yet, though it certainly proliferates in the world of arts and journalism.
6. Other minerals include copper, nickel, manganese, chromium, cobalt, zinc, rare earth, silicon etc.
7. For a critical discussion of extractivism (a system of accumulation that involves the transfer of wealth and raw materials from the periphery to the centre, associated with a colonial type of relation) and neo-extractivism (the assumption, in the periphery, that resource extraction can provide the basis for a nationally governed development), see Acosta (2013). It is worth noting that the term extractivism is also used to refer to a variety of domains unrelated to resource extraction *strictu sensu* (for example, Gómez-Barris 2017; Mezzadra and Neilson 2017).
8. It is widely assumed that mining activities have virtually disappeared from Europe in the past five decades, though this is not entirely true. The European mining industry still accounts for a significant supply of minerals but has become entirely dependent on import (specifically, from Asian countries) for today's strategic minerals – from lithium and graphite to rare earths. Other factors, from the massive mechanization of extraction and the considerable downsizing of the labour force, may account for

the marginalization (or even invisibilization) of a sector that accounted for much working-class conflict. A fact that may explain the 'political' demise of the mining industry and the mine specifically as a site of class struggle (see Buu-Sao, this book).

9. The wave of mine closures in Europe happened at the same time as mineral extraction was growing in Africa. This also affected labour mobility among European workforces. As shown by Zanini (this book), mineworkers from the Alpine mining region migrated to work in the Ugandan mining industry in the 1960s and 1970s. Literature about the African Copperbelt holds a special place in the anthropology of mining and urbanism, due to the work of a group of scholars later associated with the Manchester School (Ferguson 1999; Powdermaker 1962).
10. For example, the well-known Ok Tedi Mine project, 'one of the first conflicts between mining companies and communities to gain international prominence' (Kirsch 2014: 18).
11. In his detailed scrutiny of Marx's ecology, Paul Burkett (2014 [1999]: 112) points out how 'capitalism's accelerated throughput involves a conflict between the time nature requires to produce and absorb materials and energy versus the competitively enforced dynamic of maximum monetary accumulation in any given time period by all available material means'.
12. Wallerstein's world-system theory inspired more comprehensive elaborations of global environmental change, such as Moore's (2015) 'world-ecology' or Hornborg's (1998, 2012) 'ecological theory of unequal change' (see also Hornborg, McNeill and Martinez-Alier 2007).
13. The full list of participants at the event included: Paola Atzeni (University of Cagliari), Francesco Bachis (University of Cagliari), Alla Bolotova (University of Helsinki), Doris Buu-Sao (University of Lille), Kristien Geenen (Université de Liège), David A. Kideckel (Central Connecticut State University), Cristiano Lanzano (Nordic Africa Institute, Uppsala), Targol Mesbah (California Institute of Integral Studies), Cecilie Vindal Ødegaard (University of Bergen), Francesca Pugliese (Université de Liège/University of Leiden), Antonio Maria Pusceddu (CRIA/ISCTE-IUL), Tomasz Rakowski (University of Warsaw), Andreza A. de Souza Santos (University of Oxford), Felice Tiragallo (University of Cagliari), Pier Paolo Viazzo (University of Turin), Paul J. White (University of Nevada), Roberta Clara Zanini (University of Turin), Filippo M. Zerilli (University of Cagliari).

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