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Mining legacies—Broadening understandings of mining impacts

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1. Introduction

While historically the extractives sector has done little to address the impacts of its activities (Harvey, 2014, 8), recent decades have seen resource companies "become more socially and environmentally conscious" (de Lange et al., 2018, 269). The sector appears to have undergone profound changes as reflected in industry discourses around sustainable and responsible mining and mining for development (International Council on Mining and Metals, 2001; International Institute for Environment and Development, 2002). These discursive changes are promulgated and promoted widely through resource sector initiatives (e.g. Global Mining Initiative and Mining, Minerals and Sustainable Development Project), inter-governmental as well as public-private sector forums (e.g. Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development, World Economic Forum) and global finance and development institutions (e.g. World Bank, International Monetary Fund, OECD). These days, resource extraction purports to contribute to sustainable development (International Council on Mining and Metals, 2001, 2015) and to the United Nations Sustainable Development Goals (SDGs) (United Nations Development Programme et al., 2016; Minerals Council of Australia, 2018), receiving widespread endorsement as a driver of economic development and as a vehicle for poverty alleviation (Pegg, 2003; McMahon and Moreira, 2014).

Undeniably, the sector has instigated notable improvements pertaining to the efficiency and safety of mining operations (Kohler, 2015), the use of more stringent environmental impact protocols and environmental practices (Morrison-Saunders et al., 2015), as well as mine site rehabilitation (Gardner and Bell, 2007) and stakeholder engagement (Kemp, 2009). Various sector-specific codes have been developed for the voluntary adoption by mining companies endeavouring to ensure that mining activities have minimal impact and provide lasting value to resource-rich countries and their communities (Amezaga et al., 2011; Laurence, 2011; Frederiksen, 2018). In addition, regulatory changes by government over the years have also sought to ensure a better balance between industry and community interests and to achieve more positive social and environmental outcomes (Williams, 2012).

Despite the enlightened rhetoric reflected in industry codes and best practice guides, however, these accountability mechanisms are seen as largely ineffectual in terms of delivering improved social and environmental outcomes or community empowerment (Sethi and Emelianova, 2006; Frynas, 2009; Sethi, 2016) given that breaches are rarely enforced, accountabilities for industry are weak, and mining companies represent their position as apolitical. Many unresolved questions thus remain about the economic, environmental and social consequences of resource extraction (De Sa, 2019), which are explored within the various contributions to this special issue. The contributing authors traverse major themes including cultural legacies; wellbeing, agency and resistance, acknowledgment and distorted realities; or the struggle to create positive legacies, understanding the perceived shortcomings of the extractives sector chiefly in Stanley Cavell's[1] terms as a failure to acknowledge costs to others.

These perceived failings have resulted, unfairly as argued by some (Laurence, 2020), in low levels of public support (Mitchell, 2020) and perceptions "that mining cannot be trusted to act in the best interests of society" (Fraser, 2019, 788); as suggested by Whitmore (2006, 309) "[f]rom the perspective of mine-affected communities nothing seems to have changed". Sentiments such as these show that mining companies find themselves operating in evermore "complex and adversarial contexts" (Littleboy et al., 2019; 1086), as illustrated also by the sharp rise in industry-community conflicts over the last 20 years (North, Patroni, and Clark 2006, Temper, Del Bene, and Martinez-Alier, 2015; Andrews et al., 2017; Watts and Vidal, 2017). In this special issue, the grim outlook for future industry-community relations (Bebbington et al., 2018), especially in areas where communities are disproportionately affected by mining activities such as communities whose livelihoods and culture are critically connected to the lands that are subject to mining

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[1] See Stanley Cavell's (2002b) work on knowing versus acknowledging. In Cavellian terms we can consider that negative legacies represent a lacuna between what we know about resource-led development but fail to acknowledge; in Cavell's (2002a, 1) words we live "between acknowledgement and avoidance".

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(Holt-Gimenez, 2008; Horowitz et al., 2018), is examined by several of the contributors (see this issue: Poelina et al., Roche et al., and Sinclair).

Community disillusionment with mining also relates to the unfulfilled promise of resource-led development. While the resource sector is positioned as critical for the economic advancement of low to middle-income economies (Roe and Dodd, 2018), it has been shown that resource extraction alone does not automatically deliver equitable development, because at best, the industry's development impacts are not fully known (Owen and Kemp, 2013)—or worse, as Cavell would argue, not acknowledged—and at worst, responsible for exacerbating poverty (Gamu, Le Billon, and Spiegel, 2015). There is acknowledgement in academic circles (Black, 2013) and increasingly within industry (Butler, 2017) that it is no longer sufficient to conceive of the social contribution of mining solely in terms of paying taxes, wages and dividends. Nevertheless, economic legitimacy discourses continue to buttress social licence claims made by resource companies and their industry bodies (Parliamentary Joint Committee on Corporations and Financial Services, 2006; Brueckner and Eabrasu, 2018) in alignment with what Kirsch (2010) considers a growth-centred approach to sustainability that is prominent among mining companies (Broad, 2014), which focuses chiefly on economic variables (Banks et al., 2016). Consequently, resource extraction is commonly found to merely contribute to what Hart (2001) describes as *little 'd' development* in contrast to *Big 'D' Development* that has the potential to change a country's "economic, social, political and environmental conditions to sustainably enhance [its society's] wellbeing and capabilities" (Frederiksen, 2018, 496, see also Roche et al., Luke et al., Sinclair, Poelina et al., Measham et al. this issue). Contrastingly, the *little 'd' development* approach reflects a mindset that is agnostic towards questions of 'development for whom?' and 'at whose expense?', since the broader social benefits of resource development are simply implied and expected to flow from resource extraction. The scant attention given to matters of distribution thus commonly results in the skewed sharing of costs and benefits across society (e.g. Parker and Cox, 2020)–uneven development. As such, resource development is positioned as depoliticised, where the elevation of resource companies as agents of development casts them as neutral (Rajak, 2011; Spencer, 2018). But this depoliticisation ignores the enormous power wielded by resource proponents where inequality is often exacerbated around their large extractive projects; indeed, legacies of conflict and resistance to extractive projects are well documented in the literature (Kemp et al., 2011; Graetz and Franks, 2016; Sandlos and Keeling, 2016; Wayland and Kuniholm, 2016; Campbell and Hatcher, 2019, Sinclair this issue).

2. The legacies of resource extraction

Analogous to the widespread belief in the automatic diffusion of wealth created from resource extraction, adverse environmental and social impacts of extraction are assumed to be outweighed by the benefits it produces (Sagebien et al., 2008; Davy, 2017); the kind of trade-off and off-set mentality that is frequently the target of critics in the extractives and general business literature (Kepore and Imbun, 2011; Benabou, 2014; Slawinski and Bansal, 2015). Despite many operational improvements, however, resource extraction remains one of humanity's most environmentally harmful activities (Carvalho, 2017) with many effects on biogeochemical cycles and on human and ecosystem health still poorly acknowledged[2] (Hudson-Edwards, 2016). The global footprint of the extractives sector is growing rapidly, especially as rising resource demand is driving the decline in ore grades[3], which is seen to exacerbate the generation of waste volumes and the resource intensity of extraction (Mudd, 2010; Atlin and Gibson, 2017). In various mining regions around the world environmental impacts have been increasing sharply in the form of landcover disturbance as well as pollution to land, waterways and the atmosphere (Jacka, 2018); for example, growing impacts have been observed in relation to coal mining and unconventional gas development in Australia (Jackson et al., 2016), sand mining in India (Torres et al., 2017), and coal mining in Mongolia (Tao et al., 2015) only to name a few, and the perpetual injustices associated with excluding traditional knowledge in the remediation, reclamation and restoration, as observed at legacy gold mines in the Northwest Territories Canada (Sandlos and Keeling, 2016). Even though environmental impacts of extraction are often considered to be highly localised, various fields of science have become increasingly alive to how mining activities affect ecological processes over broad geographical scales, rendering the impacts of mining truly global (Bridge, 2004). In particular, forecasts of a two-and-half-times increase in global material demand by 2050 (Krausmann et al., 2018) raise the spectre of an intensification of mining impacts[4] and speak to a re-imagining of the role of mining in the *Anthropocene*, which has become an umbrella term denoting the ubiquity and intensity of anthropogenic environmental change (Crutzen, 2002).

The last few decades saw mining companies starting to address more rigorously the environmental impacts of resource extraction (Worrall et al., 2009), which are often at the heart of industry-community disputes (Bebbington, 2014; Saenz, 2019), and today these are a central aspect of companies' risk management (Ernst & Young, 2017; KPMG, 2021). Over the years, there has been a growing awareness of the long-term nature of these impacts, for example, in connection with the extraction of uranium, gold, silver and copper as well as tar sands and shale gas (Comey, 1975; Nriagu, 1993; Pestana and Formoso, 2003; Furlow, 2014), which has given rise to a 'mining legacy' discourse that denotes ongoing negative impacts stemming from areas previously subject to mining (either closed, orphaned or abandoned mine sites) (Whitbread-Abrutat, 2008; Worrall et al., 2009; Unger, 2012; Pepper, Roche, and Mudd, 2014; Unger, 2017). Here mining legacies speak to the long-lasting, if not perpetual (Kempton et al., 2010) negative environmental impacts stemming either from operating mines or sites where operations have ceased, which can include contamination and changes to local hydrology evidenced by the growing impact and importance of acid mine drainage (Simate and Ndlovu, 2014), as well as habitat fragmentation and other adverse effects on environmental flows and ecosystem functions (Lima et al., 2016).

It bears noting, however, that one of the first broader conceptualisations of mining legacy(ies) was by the Mining, Minerals and Sustainable Development Project (MMSD) in 2002. The MMSD project which sought to ensure the extractive sector made a better contribution to sustainable development was created in response to the "… tremendous pressure [on the industry] to improve its social, developmental, and environmental performance" (iied undated). The MMSD Report, *Breaking New Ground* described how "[T]he negative social and environmental legacy of the sector is a major obstacle to building trust and moving forward. Abandoned sites and communities, persistent waste and pollution issues, aggrieved peoples: the list is long" (MMSD Project, 2002, xxiv). This reflects the significant pressure on major industry players (Rio Tinto, BHP and Freeport McMoRan) at the time from the infamous mines at Freeport, Ok Tedi and Bouganville on the Island of New Guinea (Filer, Burton, and Banks, 2017). This expansive understanding of impacts, both social and environmental, included reference to a range of specific negative legacies and their causes including; conflict, financial liability, community development, abandoned mine sites, abuse and mistrust, waste disposal, uranium tailings, corruption, poor

[2] In Cavellian terms, these negative legacies are *known* but often remain *unacknowledged*.

[3] The suggestion that ore grades are declining is challenged by some analysts (Ericsson et al. 2019).

[4] "Fossil fuel corporations benefit from the current system at great cost to the climate and the rights of First Nations people and future generations"(350.org 2020, 28).

performance and inadequate accountability (MMSD Project, 2002).

2.1. The social economy of legacy effects

The importance of the social legacies was further reinforced by discussions at the IUCN-ICMM[5] (2003) workshop and again in a MMSD follow-up survey by Whitbread-Abrutat (2008) where a distinction was made between a mining legacy site, which was dominated by environmental concerns, with a more general understanding of mining legacies that encompassed social impacts as well.

Unfortunately, like many of MMSD findings this comprehensive and progressive rendering of mining legacies had little practical effect for people, places or industry as shown by research on community impacts of resource extraction, which points to impacts across the entire social economy of nations (Viveros, 2016) and identifies a raft of social, racial, class and gender tensions associated with mining (Berger, 2007; Worrall et al., 2009; Humby, 2016). In relation to gender, for example, a growing body of literature is focused on the gendered legacies of mining brought about by the globalisation of resource extraction and attendant social, political and cultural re-configurations (Klubock, 1998). In this issue, Sinclair's feminist analysis of three case studies sheds light on divergent gendered mining legacies ranging from victimisation to empowerment. By questioning the 'women-as-victims' approach commonly found in studies of gendered impacts of mining, Sinclair (this issue) points to the possibility of both resistance to, and participation in, mining providing pathways for overcoming the structural inequalities resource extraction tends to aggravate. Contrastingly, Lahiri-Dutt, Amor and Perks (this issue) explore the impacts of gender-selective labour practices in gold mining areas in West Lombok. There, gender-selectiveness, referring to the delegation of women to peripheral and invisible but often more dangerous tasks in the gold extraction process, is seen to produce embodied legacies.

Impacts, however, also go beyond the often more visible human health impacts such as those caused by mercury exposure in gold mining regions (Malm, 1998; Hilson, 2002; Bose-O'Reilly et al., 2008). These tensions – inter alia – include issues such as the exploitation of migrant labour (Humby, 2016), child labour and subaltern slavery (Sovacool, 2021), mine safety (Saleh and Cummings, 2011), community impacts stemming from the influx of foreign direct investment and the privatisation of mining such as community displacement and the destruction of livelihoods (Boocock, 2002; Simutanyi, 2008). Legacy effects are also studied in relation to the tensions between mining and other sectors such as tourism (Dwyer, Forsyth, and Spurr, 2016) and agriculture (Hota and Behera, 2015; Sneegas, 2016; Jacquet et al., 2018; Babatunde, 2020), legacies such as purpose-built mining communities, the way in which these are being replaced through fly-in/fly-out workforce models and in turn how these impact on local economies and community dynamics (McDonagh, 2010).

The above is not to suggest that mining legacies cannot be positive in nature. For example, positive legacies can come in the form of economic benefits reaped by communities capitalising on tourism generated from historic sites and buildings from past mining activities (Martinez-Fernandez et al., 2012, Measham et al. this issue). Also, Sinclair (this issue) speaks to what could be regarded as 'immanent positive legacies'[6], particularly in relation to women's resistance to, or participation in mining, and their gains in agency and social networks. Notwithstanding, while the resources sector is committed to the creation of lasting value, in other words a commitment to positive legacies, legacy impacts tend to have largely negative connotations (Atlin and Gibson, 2017).

Perceived antidotes to negative legacies commonly entail calls for improved CSR practices (Fordham, Robinson, and Blackwell, 2017), better community engagement, especially with First Nations peoples (Graetz, 2014), and for proper recognition to be given to community values and traditional knowledge systems (Sandlos and Keeling, 2016). Recent work has also focused on ways in which the sector could become more effective in its contribution to the global sustainability agenda, for example, by way of cross-sectoral collaboration (Yakovleva, Kotilainen, and Toivakka, 2017), increased diversification (de Lange et al., 2018) and community outreach (International Council for Mines and Metals, 2013). Yet, while legacy thinking does extend to communities, social impacts per se are frequently treated as undifferentiated wholes (Carvalho, 2017). The social dimension of resource extraction is a relatively recent addition in the recent decades to the management responsibilities of companies and generally not accorded the same level of attention as the environmental dimension (Mitchell, 2003).

Arguably, this artificial demarcation highlights the difficulty of mining companies and business in general to align economic aspects of their operations and social matters (Husted and de Jesus Salazar, 2006). As suggested by Owen and Kemp (2013, 32), "[c]ompanies routinely establish a deep understanding of local ecologies in order to 'measure their environmental impacts". Yet, whilst resource extraction is socially and culturally disruptive by its very nature (Harris, 2007), resource companies tend to apply an, at times overly reductionist (Bond and Morrison-Saunders, 2011), management and engineering approach to their social impacts (Kilian, 2008) and see "investments in a deep understanding of the local culture as both costly and optional" (Owen and Kemp, 2013, 32). Even where these investments are made, the 'social' and the 'cultural' are at risk of being poorly captured and thus poorly managed (Roche et al., 2021). In part, this may be explained by the perceived lack of integration of corporate social responsibility (CSR) concerns in companies' core business (Owen and Kemp, 2013). However, this disconnect illuminates calls for attitudinal and behavioural changes within companies as a prerequisite for firms securing trust and support from resource-rich communities (Harvey, 2014) since actions taken to date oftentimes strike as incommensurate remedies to experienced problems.

In this context, the contribution by Roche and colleagues (this issue) draws attention to the largely unseen existences of communities in the shadows of mining operations. Their use of community stories to develop a portrait of community life in Venembeli, Papua New Guinea, sheds light on local lived realities, which commonly lie beyond the horizon of resource companies and their impact assessment processes. The resultant gap between local understandings of community and hegemonic Western framings of community impacts and benefits helps explain as to why and how mining companies are at risk of undermining community thriving. Relatedly, Poelina et al. (this issue) address Western hegemony in their exploration of the colonial character of mining in Western Australia's Kimberley region. There, the proposed extraction of water from the Fitzroy River is argued to risk the continued dispossession and marginalisation of traditional landowners and to pose a threat to a host of ecological and cultural values. Both papers highlight mining legacies stemming from resource colonisation, which continues to affect the lands and livelihoods (White, 2013) as well as social and cultural norms of First Nations peoples (Nightingale et al., 2017).

Socio-economic legacies at the community level are addressed in this issue in contributions by Luke et al. and Measham et al. The former paper explores divergent community responses to unconventional gas development in Australia, the United States and Wales, which the authors attribute to differences in social, cultural and environmental factors and differing regulatory frameworks. Their analysis taps into the building blocks of community resilience, which shape communities' ability to respond to extractive development proposals. The latter article

[5] IUCN is the World Conservation Union, ICMM is the international Council on Mining and Metals, a member-based organisation representing many of the largest global mining companies.

[6] Following Roche, Sindana, and Walim (2019, 978), immanent development, in contrast to intentional development which is deliberate (i.e. creation of infrastructure), "refers to spontaneous outcomes of development that can be chaotic, negative and conflictual".

by Measham and colleagues focuses on local heritage values attached to a previously mined area in South Australia and the ways in which these could either be threatened by, or co-exist with, a proposed development of residual mineral deposits. The authors highlight the potential of, but also higher levels of complexity for, renewed mining activities in areas where former mine sites have taken on new identities and values. The social licensing of the reindustrialisation of areas such as these is seen to critically depend on the degree to which they can align with heritage values former mining legacies have given rise to.

2.2. Resource extraction: thinking long-term

Finally, questions around mine closure are addressed in the contributions by Pepper et al. and Keenan et al. in the Australian and global contexts respectively. Pepper and colleagues take issue with the regulatory challenges pertaining to the temporary closure of mining operations (care and maintenance (C&M)) and the prevention of mine abandonment and the associated risk of environmental legacy sites. While C&M is found to be used strategically by mining companies to circumvent formal mine closure requirements, a tightening of legal requirements in this regard is found to be equally problematic for its potential to drive mine abandonment. Thus, the authors call for more research on regulatory settings that produce closed mines. Keenan and Holcombe in this regard call for the full reconceptualization of mine closure. Based on their review of 141 cases globally, the authors argue that mining should be regarded as temporary landuse only and that planning horizons for landuse should thus be extended far beyond the life of mines and become a central element of resource development planning as a means of aligning mining operations with community standards and expectations. This builds on the work of Atlin and Gibson (2017, 45) who draw attention to considerable, but largely unrealized potential, for mining and associated activities to generate positive legacies. Arguing that sustainability-based cumulative effects assessments "that adopt long term perspectives and focus on desirable futures can foster serious attention to, designing and using mining activities and related revenues to build bridges to more sustainable futures, and develop stronger capacities to manage future opportunities and problems".

3. Concluding remarks: a legacy lens

Overall, it stands to reason, that the uneven development outcomes of mining (Smith, 2010; Jacka, 2015) are realised most acutely by those communities living next to mining operations who routinely experience exclusion, inequality and injustice. The Covid-19 pandemic has brought into sharp focus the prevalence of these intersectional inequalities and how they are reinforced and exacerbated in the global efforts to return to business-as-usual as quickly as possible. But this contemporaneous perfect storm–the raging pandemic in the Anthropocene epoch at a time of increasing calls for improved legacies in the resources sector–demands we do anything but return to business-as-usual. As Arundhati Roy instructs us[7], we must collectively 'un-learn' and de-colonise our extractivist ways of being in the world that are premised on extractive development and colonial bondage labour in the pursuit of supposed development and progress. There is no denying that resource extraction is here to stay, which in the face of growing material demand world-wide, continues to be seen as critical for the realisation of a low carbon future[8] (Fraser, 2019), as well as for the advancement of low to middle-income economies (Roe and Dodd, 2018). As such, a better balance is needed between the seemingly pre-programmed growth of extractive industries and persistent development needs on the one hand, and a worsening environmental outlook and the sector's putative 'social licence gap', on the other hand. Failing that, 'lasting value' or positive legacies from mining are likely to remain a distant prospect.

It is in this context that this volume seeks to take issue with, and add nuance to, discussions about the various kinds of mining legacies described above and their underlying drivers. We consider the legacy concept a useful lens for the exploration of lasting mining impacts for it prompts thinking about the past and the future for it forces us to consider heterogeneity and inequity within the present, the future and the past, rather than being mesmerised by promises of *little 'd' development*, so often constrained to the economics of the day. When thinking about mining legacy we are prompted to ask whether the present generation has "a duty to continue and build upon a legacy, to remain on the same path, or to redress a legacy by not only changing course but also engaging with the wrongfulness and damage that may have been caused (Humby, 2016, 653). Also, a legacy approach can assist with the prevention and reduction of potential mining legacies before they occur (Pepper, Roche, and Mudd, 2014). We thus seek to bring together and build on understandings of the breadth of legacy issues in mining with a view to enhancing their visibility as well as bringing them within the purview of mine planning processes and industry regulation. To this end, this special issue draws on empirical insights from across the globe, albeit with a strong Australian focus, seeking to articulate a research agenda for, and inviting debate on, the future of mining and mining-affected communities.

We have left the final synthesis and collaborative sense-making of the learnings that come from the individual contributions featured in this special issue to a confluence of authors' calls for a clearer sense of connectedness (Roche et al. this issue). As most articles featured here point to the existence, or possibility of negative legacies from mining, the attempt here is to reverse the gaze and to explore the potential for positive legacies based on the insights gained from the preceding articles. In doing so, the authors seek to highlight the utility of the legacy lens but also to contribute constructively to the debate on mining impacts and help shape the practices in a sector that has much potential to drive positive change and facilitate forms of development that enable community thriving, wellbeing and resilience. Whether taken together, or separately, these acknowledgements caution against our failure to both acknowledge and pay for what are the 'true' costs of our lifestyles.

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[7] See https://www.ft.com/content/10d8f5e8-74eb-11ea-95fe-fcd274e920ca

[8] The virtues of so-called 'green extractivism' are being questioned, however, by post-extractivist (Brand, Boos, and Brad 2017) and green economy critiques (Dunlap 2017), especially as resources underpinning certain renewable energy technologies are in short supply globally (Lund 2007).

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