

THE MINING BOOM AND WESTERN AUSTRALIA'S CHANGING LANDSCAPE: TOWARDS SUSTAINABILITY OR BUSINESS AS USUAL?

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ABSTRACT

The practices and public reputation of mining have been changing over time. In the past, mining operations frequently stood accused of being socially and environmentally disruptive, whereas mining today invests heavily in 'socially responsible' and 'sustainable' business practices. Changes such as these can be witnessed internationally as well as in places like Western Australia (WA), where the mining sector has matured into an economic pillar of the state, and indeed the nation in the context of the recent resources boom.

This paper explores the role of mining in WA, presenting a multi-disciplinary perspective on the sector's contribution to sustainable development in the state. The perspectives offered here are drawn from community-based research and the associated academic literature as well as data derived from government sources and the not-for-profit sector. Findings suggest that despite noteworthy attitudinal and operational improvements in the industry, social, economic and environmental problem areas remain. As mining in WA is expected to grow in the years to come, these problem areas require the attention of business and government alike to ensure the long-term sustainability of development as well as people and place.

KEYWORDS

Western Australia; developmentalism; resource-based development; sustainable mining; sustainable development

INTRODUCTION

Sustainability and social responsibility are recent additions to the vocabulary of most mining companies (Yakovleva, 2005). Historically, the mining sector has a chequered performance record concerning the management of its social and environmental obligations (Jenkins, 2004). Also, more recent problems surrounding mining operations in places such as Papua New Guinea (Banks & Ballard, 1997) and Indonesia (Bruno & Karliner, 2002) are a reminder that disputes in mining cannot be consigned to history. Notwithstanding, the last two decades have seen positive changes in mining in response to growing concerns about the sector's social and environmental impacts.

There is increased recognition that genuine engagement with environmental and social issues is a prerequisite for gaining and retaining companies' "social license to operate" (MMSD Project, 2002; Prno & Slocombe, 2012). Whilst in part responding to public and regulatory pressure, mining companies have also started to change

practices in light of the benefits associated with responsible business conduct. The business cases for sustainable development and corporate social responsibility see socially responsible and environmentally sound business practices as contributing positively to the business bottom line (e.g., Holliday, Schmidheiny, & Watts, 2002; Hopkins, 2003). Yet, enlightened self-interest aside, what remains in question is whether such changes in sustainability practices in mining have been effective across the sector and led to a reduction in the impacts the sector has traditionally been having on people and place.

The sustainability of the mining sector is a vexed issue. ‘Sustainable mining’ strikes some commentators as oxymoronic (Rajaram, Dutta, & Parameswaran, 2005; Horowitz, 2006) in that the non-renewable character of mined resources implies that mining “fails to qualify as sustainable development *sensu stricto*” (Amezaga, Rötting, & Younger, 2011, p. 21). Others see in sustainable mining a reference to corporate profits and economic development that will provide lasting value beyond the life of mining projects (Laurence, 2011), perceived yet again by others as a “corporate strategy to conceal harm and neutralize critique” (Kirsch, 2010, p. 87). While noting this debate, for the purposes of this paper the emphasis will be placed on the contribution of mining to sustainable development *sensu lato*; understood here in terms of the way in which the sector balances social, economic and environmental interests (Rajaram et al., 2005) and contributes positively to development and community well-being. This aligns with the general principles of sustainability (see MMSD Project, 2002) in mining supported by the International Council on Mining and Metals (ICMM).

This paper explores the contribution of mining to sustainable development in Western Australia (WA). The mining sector has been the recipient of considerable support from successive state governments who have invested in the economic development and exploitation of the state’s natural assets since foundation (Walker et al., 2002). The state government’s ‘developmentalist’ drive (see Kellow & Niemeyer, 1999) reached new heights in recent years with the onset of the present mining boom, with the economic successes of the mining sector seemingly hardening the resolve of the state’s political leadership to make WA ‘the world’s biggest resource industry [...] economy’ (APPEA, 2011). To ensure that ‘future growth is not hampered by structural impediments or red tape’ the success of major resources projects has become the Premier’s ‘direct responsibility’ (Barnett, 2009), resulting in recent years – inter alia – in the streamlining of government approval processes and fast-tracking of industry development applications. The government’s overt support for the mining sector highlights its perceived importance to the well-being of the state and its economy measured along indicators such as income, employment and GDP growth.

The resources boom has reignited research interest in, and public debate on, the costs and benefits mining delivers to society (Nicol, 2006; Mayes, 2008; Carrington & Pereira, 2011; Cleary, 2011; Haslam McKenzie, 2011; Lawrie, Tonts, & Plummer, 2011; Cleary, 2012). This article seeks to add to this debate by way of shedding light on the unevenness with which both the costs and benefits of the boom are being spread in WA. Based on empirical work and relevant academic literature as well as data derived from government sources and the not-for-profit sector we offer a multidisciplinary account from behind the scenes of the mining boom, drawing attention to both direct and indirect impacts mining has on people and place in WA.

Specifically, we focus on the economic, environmental, Indigenous and social dimensions of the mining boom. The findings inform a discussion which draws attention to the need for a more balanced treatment of the positive and negative impacts of mining – amplified by the current boom – to arrive at a more robust assessment of the mining industry’s contribution to the sustainability of development in the state.

THE ECONOMIC BENEFITS OF MINING IN WESTERN AUSTRALIA

The economic benefits of Western Australia’s mining boom have been widely publicised and are often used to highlight the importance of the sector to the well-being of the state by industry, government and its departments (Barnett, 2011; DMP, 2012; Mining Council Australia, 2012). Commonly cited benefits are summarised below.

In WA, there are currently 1050 operating mine sites, around 170 mineral processing plants and over 70 operating oil and gas fields, which form the hub of the state’s economic success story and contribute around 29% to overall production in the state (ABS, 2012d) and 95% of merchandise exports (ABS, 2012d). The growth in mining output and export value can be explained in terms of high export prices and growth in demand for key commodities in recent years. Key export commodities for WA are iron ore and concentrates with an export value of \$13.6 billion, which rose over 70% within the last 24 months as well as energy resources such as natural gas with a current export value of nearly \$2.1 billion (ABS, 2011c). These trends, despite current signs of slowing (Wade & Martin, 2012), are believed to continue in light of ongoing investments in the sector and related industries (ABS, 2012d; National Australia Bank, 2012).

State revenue has certainly benefited from the mining boom with the resources sector contributing around 30%. In 2010/2011 the sector generated \$4.9 billion in royalties paid for the Western Australian Government Consolidated Revenue Fund (DMP, 2011), which represents a 375% increase from \$1.03 billion in 2001–02. Since 2008, 25% of the state’s mining and onshore petroleum royalties have been distributed annually to the state’s regional areas via the Royalties for Regions Programme (\$817.8 million in 2012-2011). This programme aims to build the strength and vibrancy of regional, rural and remote communities by providing funding to supplement current infrastructure projects, community service programs and competitive grant opportunities (DRDL, 2011).

The resources sector’s growth has been accompanied by strong employment growth in mining. While only 3.6 per cent of WA’s work force was employed in the sector in 2000 (ABS, 2012c), this figure is now believed to have risen to around 10 per cent (Williams, 2012). The employment growth is also reflected in the overall population levels in Western Australia with 2011 census figures revealing that WA’s population boomed since the 2006 census recording a 14.3 per cent increase over the five-year period (ABS, 2012d). In terms of income generation, WA’s mining boom has been responsible for sharp increases in weekly earnings with five of the state’s mining towns ranking among the nation’s richest top ten postcodes; Dampier is leading with 22% of its residents earning more than \$4000 per week (ABS, 2012a). Recent years

saw wage increases in WA outperform those of all other states, with males employed in mining registering the strongest growth of 33% between 1998 and 2009 (ABS, 2009).

The economic benefits mining delivers in terms of its contribution to state revenue and regional development as well as employment and income are widely seen as the sector's key contribution to the state. While these benefits cannot be denied, data reveal that these benefits are not only spread unevenly but also that some segments of society suffer economic hardship consequent to mining.

Income growth as a result of the mining boom has largely been restricted to people employed within the resources sector; a situation mirrored nationally (Richardson & Denniss, 2011). Record income growth in mining has occurred parallel to only very modest income growth in sectors such as hospitality (ABS, 2009). CPI-adjusted incomes across most income categories fell in recent years making WA the state with the highest but also most uneven incomes of any state with a Gini coefficient¹ of 0.367 (ABS, 2011b).

Income disparities have flow-on effects, especially during periods of growing price pressures. The time between 2006 and 2008 saw household cost increase by approximately \$132 per/week or 23% on basic living expenses as suggested by the Western Australian Council of Social Service (WACOSS) (2009). ABS data also point to sharp price rises between 2009 and 2011 in the cost of essential items such as food (7%), utilities (~32%) and health (9%) (ABS, 2011a). The situation is arguably worse in the area of housing. It is estimated that WA's boom has attracted around 1000 new arrivals to the state per week in recent years with the resultant housing demand driving up house prices and the cost of rental accommodation. Real Estate Institute of WA (REIWA) data indicate that the median weekly rent for Perth in the December 2011 quarter was \$400 per week – an increase of 8.1% from 12 months earlier – which represents over 65% of the 2011 weekly WA State Minimum Wage (Western Australian Council of Social Service, 2012). The median house price in Perth is at around \$480 000. Overall, the boom has meant that low-income earners needed to absorb higher costs for basic living essentials and housing while at the same time facing reductions in real income. This is also mirrored in the statistics of social service providers who point to a growing number of incidences of economic hardship (e.g., The Salvation Army Australia, 2012).

In rural and remote parts of WA such mining boom-related impacts are even more pronounced. REIWA points to median house prices for mining towns like Karratha and Port Hedland at \$890 000 and \$702 000 respectively (2012b) with a median cost of rental accommodation of around \$1500 per week (2012a). The high wages realised in the mining sector in these parts of the country also stand in stark contrast to the structural disadvantage experienced there. While high incomes are recorded across the Pilbara and Kimberly regions where mining occurs, these areas also record high, localised unemployment and low income (ABS, 2012b), creating a high-income-low-income dualism in Western Australia which is reflected nationally in the two-speed economy (Goodman & Worth, 2008). As argued by Langton (2010), the mining

¹The Gini coefficient is a measure of income inequality in a society. Zero indicates total equality, and 1 indicates maximal inequality.

boom drives and accelerates disparity between towns in WA.

In this regard the aforementioned Royalties for Regions Programme promises relief through targeted funding to help counteract boom-induced housing shortages and escalating prices by way of investing – inter alia - in social infrastructure. Thus far, however, progress has been slow (The Australian Mining Review, 2012), with the programme also receiving criticism for purportedly making funding available along political as opposed to socio-economic lines (Powel & Thompson, 2012). At the political level, problems surrounding cost of living increases and housing shortages are recognised. Growing public housing waiting lists, however, attest to a degree of policy inertia despite calls for urgent government action (Community Housing Coalition WA, 2012).

Undeniably, the mining boom delivers economic benefits for the state; the benefits of such economic success, however, are found to be limited to people working in the industry whilst the cost of the boom are largely borne by structurally weaker community groups across WA. Many of these adverse effects cannot be attributed to mining directly. Nonetheless, the dramatic growth of the industry in recent years did have large, indirect community impacts felt across the state.

MINING AND THE ENVIRONMENT

Notwithstanding greater awareness, improved practices and more exacting environmental regulations, the resource intensity of WA's economic activities and the extraction of primary materials remain inevitably linked to environmental degradation. In fact, the scale of the unprecedented expansion of the WA mining sector and the associated direct and indirect environmental changes represent key challenges for the sector's sustainability (Mudd, 2010).

The discussion on the sector's environmental performance should not only pay attention to direct, site-specific impacts but also take into account cumulative impacts and indirect effects that pose environmental and social challenges in the state and beyond. These larger scale impacts are, for example, linked to major infrastructure developments (e.g. roads, ports), the expansion of human settlements as well as fly-in/fly-out (FIFO) work patterns, which are all products of a rapidly growing resource extraction sector. Also, the promotion of multiple land use to foster rapid economic growth and development has led to growing tension mainly between three traditional private sector industries, mining, pastoralism and tourism. All are environmentally intense and compete for the same natural resources. Land use conflicts between these sectors, which challenge the common assumption that the immense size of the state provides almost unlimited resources for its economy, are thus also a logical consequence of WA's mining boom (Hughes & Catlin, 2010; Department of Sustainability, Environment, Water, Population, & Communities, 2011).

The environmental impacts of WA's natural resource exploitation such as loss of biodiversity, water shortage and pollution and the production of large quantities of waste are discussed in more detail below. The exact nature and extent of these impacts is dependent on a number of factors, including the mode of extraction and the operation of the mine (e.g. open cut or underground), its geographical location and the phase of its operational life (ABS, 2003; EPA, 2007b). In addition, the impacts of an ever-increasing demand for natural resources and thus a continuing expansion of

mining activities need to be taken into account when assessing their environmental costs. For example, the energy requirements of large scale and expanding mine sites as well as oil and gas producers have thus far outweighed gains in energy efficiency in their operations (EPA, 2007b).

Next to irrigated agriculture it is in particular the mining sector, which places strain on water resources. When combined the two activities account for approximately two thirds of the state's water consumption. Already more than a decade ago it was estimated, for example, that despite up to a third of its water being recycled, the WA mining sector consumed 428 gegalitres of water (EPA, 2007b). According to the Department of Mines and Petroleum, this figure has increased to 620 gegalitres in 2009/10 and is predicted to almost double by 2030 (Sellers, 2010). Although there are major variations in the way the use of water is reported (Mudd, 2010), the growth in demand is indisputable and has major implications for the sector's sustainability, in particular in the context of WA's worsening water scarcity (DoW, 2009). Data on water allocations by the WA Department of Water Licences illustrate that the mining sector not only receives with 30% of all licences the largest share, but is also with 43% the largest ground water licensee (DoW, 2012). The accommodation of further growth in the sector and its increasing water requirements thus poses enormous challenges. In particular in the arid and semiarid areas of the state, such as the Pilbara region, increased water consumption has the potential to alter water tables and lead to the depletion of groundwater reservoirs as shown by McCullough & Lund (2006).

Another impact of mining activities is the imprint they leave on the landscape. "Despite corporate and government promises ... past resource booms have left mining and exploration damage scattered across the WA landscape, creating ongoing environmental effects and a liability to the state" (Nicol 2006, p. 12). Mining is responsible for lasting landscape impacts in the form of pits, tailing dams, evaporation ponds and waste rock dumps. As suggested earlier, these impacts vary across different mining operations. Gold and silver mining, for example, are amongst the most wasteful processes producing 99% waste and subsequently result in large piles of waste rock dump (Mudd, 2007b).

A major shift from underground to open cut mining in WA has, for example, also led to an exponential increase in waste products and poses increasing challenges for mine site rehabilitation (Mudd, 2010). Up to date data on this impact is difficult to obtain, but figures dating from 1986 to 2002 illustrate the extent of the problem, with more than 160,000 ha of landscape affected by mining activities (EPA, 2007b). Considering the current resource boom and the associated increase in mining activities it is likely that these figures have been rising substantially since (EPA, 2007b).

Associated with these landform modifications is the large scale clearing of native vegetation. To combat some of these losses, mining companies are required to rehabilitate the land upon completion of their extraction activities (EPA, 2007b). However, despite numerous site-specific flora and fauna studies, little information is available on the overall effectiveness of rehabilitation measures across the industry. Data from 2003 indicate that for less than a quarter of all land disturbed by mining activities preliminary rehabilitation had been carried out. These measures mainly targeted closed down open cuts and waste rock dumps, but rarely addressed the rehabilitation of tailing dams, which were no longer in use (Mudd, 2004, 2007a,

2009). But it is in particular those tailing dams, which can potentially cause ongoing environmental damage if inappropriately constructed, managed and decommissioned as they can contain high levels of highly acidic or alkaline material and toxic waste products. Ultimately, if not taken care of appropriately, this toxic waste might jeopardise the future alternative use of affected areas. McCullough and Lund (2006, p. 224) for example highlight that in “pit lakes in Australia [...] even after 50 years, ecological processes are often still very restricted”. Likewise, the flooding of mine pits with acidic water and with it the influx of dissolved heavy metals is a significant environmental concern, particularly in the absence of appropriate rehabilitation measures (EPA, 2007b). The negative consequences of these contaminations can sometimes be seen even outside the immediate mining area, since degradation in water quality, caused by acid drainage and accumulation of toxic metals as well as sedimentation, might affect receiving water bodies and ultimately aquatic ecosystems (EPA 2007b; Mudd 2009).

Although the impact of the mining sector on biodiversity might be considered as low (Lloyd et al., 2002) it cannot be ignored, given the sector’s concentrated expansion in specific regions in recent years. The state’s EPA recommended in the case of Mt Gibson and Mt Manning, for example, to prohibit mining operations due to their biodiversity values (EPA, 2006, 2007a). Nonetheless, WA’s *Mining Act 1978* permits the issuing of mining titles in some existing conservation reserves. Considering that the state features many areas that are unique in their rich endemic terrestrial and marine flora and fauna, boasting two thirds of Australia’s national biodiversity hotspots (Beard, Chapman, & Gioia, 2000; Shepherd, Beeston, & Hopkins, 2002; CALM, 2004), the current level and extent of natural resource extraction is of concern.

Furthermore, the resources sector in WA is also a major contributor to the state’s greenhouse gas emissions and in this sense also driving aforementioned problems relating to water scarcity and biodiversity loss. It was estimated, for example, that in 2002, even prior to the current mining boom in the state, it contributed more than 12 million tonnes, which is nearly twice as much as was produced only a decade earlier (EPA, 2007b). Australia-wide the mining sector is responsible for more than 12% of the country’s total greenhouse gas emissions (McLellan, 2009). These emissions stem, for example, from mineral processing, the flaring of natural gas during oil extraction but also the equipment used in a mine site’s operations. Van Berkel (2000), for instance, calculated that the trucks used in Kalgoorlie’s Superpit gold mine are responsible for nearly two thirds of its total CO₂ emissions. Other emissions of concern are the large quantities of SO₂ gas as a by-product of the processing of sulphur containing ores (EPA, 2007b).

Another factor contributing to the mining sector’s overall greenhouse gas output is often overlooked, the pollution associated with the transport of extracted resources to the end user as well as the increase in the number of the sector’s ‘fly-in/fly-out’ workers. McLellan (2009), for example, estimated that in 2008 an amount totalling 6% of the sector’s overall CO₂ production was associated with the domestic transport of resources and that shipping for export added nearly another 100 Mt of CO₂ to the industry’s greenhouse gas output. Overall, the sector not only holds the greatest share in WA’s total emissions, but has also increased its emission four fold over the past twenty years. Considering governments’ efforts to reduce greenhouse gas emissions

and also in the face of an unprecedented expansion of the resources sector, this can be considered one of the greatest challenges for sustainable development in WA and the quest for finding solutions to the risks of climate change for the state (Department of Climate Change and Energy Efficiency, 2012).

Considering the above impacts, it is not surprising that the mining sector's environmental sustainability is questioned despite significant advances over the past decades in the sector's environmental performance. The resources sector's growth and expansion has resulted in cumulative increases in environmental impacts stemming from the combination of inter-related, direct and indirect mining related impacts; many of those are only poorly understood, measured and quantified. It is these aggregate impacts that demand the attention of industry and government alike and need to be carefully balanced against the social and economic costs and benefits of resource-based development in the state.

MINING AND INDIGENOUS RIGHTS

Since the colonisation of Australia in 1788, a policy of *terra nullius* was upheld where land, thought to belong to no-one, was claimed by the British crown and the land rights of Aboriginal peoples were ignored (Wilkes, 2006). In the 1960s mining activities opened up in the Pilbara with eight major open cut mines in the Hamersley region alone – a key element in planning these mines was the exclusion of Aboriginal labour (Holcombe, 2006). By the early 1970s there were nine closed company towns in the Pilbara though today these towns are open to non-mining employees and Aboriginal people (Holcombe, 2006).

It was not until the 1976 Aboriginal Land Rights Act that the Australian government first recognised that Aboriginal Australians with a traditional association with the land could claim rights to that land (Wilkes, 2006). The Australian High Court's 1992 'Mabo' decision extended this further where the prospective scope of negotiated agreements broadened and the landmark Native Title Act 1993 recognised Aboriginal people's connection with their ancestral country and entitlement to their traditional lands according to their laws and customs (Wilkes, 2006; O'Faircheallaigh, 2008). This gave Aboriginal landowners who were Native Title claimants or holders the 'Right to Negotiate' the development of future exploration grants or mining interests (O'Faircheallaigh, 2008). However, the 1998 Native Title Amendment Act weakened the position of Native Title claimants and holders reflecting a political climate focusing on economic imperatives that marginalised Aboriginal people (Altman, 2009; Howlett, 2010). Even after substantial economic development in the Pilbara over the last 40 years, many Aboriginal communities have little to show from the benefits of the mining boom. Lower education levels compared to non-Aboriginal Australians, higher morbidity and mortality rates, crime rates, unemployment rates and poor housing have all contributed to both the poor recruitment and retention rates of Aboriginal people in the resource sector and their ongoing marginalisation (Taylor & Scambury, 2005; Gawler, 2009b). Current agreements with Aboriginal Traditional Owners and mining companies are often locked in dispute though moves have been made to improve this process (Gawler, 2009b).

Current development discourse is set within a neoliberalist agenda where the values of wealthy states and multinational corporations dominate, supported by a compliant media (Altman, 2009). Unfettered economic development has also seen the state

promote the interests of capital and subordinate Aboriginal interests (Howlett, 2010) Mining companies historically aligned with the state (Commonwealth, State/Territory) and marginalised Aboriginal perspectives on resource development on their ancestral lands (Altman, 2009). Queensland and Western Australia, both states with the largest mining interests, rejected any notion of Aboriginal control over mineral development, despite Aboriginal land rights, which led to Aboriginal Australians being increasingly excluded from both decision making and from benefits derived from resource development on their traditional lands (Howlett, 2010).

Recent literature suggests that neoliberalism and globalisation provide positive opportunities for Aboriginal communities to engage in the resource boom and mineral development, often seen as the solution to socio-economic problems occurring in Aboriginal communities (Howlett, Seini, McCallum, & Osborne, 2011). While engaging Aboriginal people to work in the mining sector can be difficult (Gawler, 2009a), mining companies have sought to redress this issue by building relationships with the Traditional Owners of the land and fostering transparency and a consistent standard of company performance in implementing agreements that deliver improved employment, cultural heritage engagement and direct and indirect benefits to the local Aboriginal people accrued during the life of the mine (Gawler, 2009a). A case study of Rio Tinto Iron Ore and the Traditional Owners of the Pilbara examined projects where Aboriginal people were engaged in developing their region through regional representation and business development to lay the foundations for a sustainable future for their communities and ensure social cohesion to support a social license to operate. Building partnerships where Aboriginal people are recognised as key stakeholders and the Traditional Owners of the land was integral to the success of such agreements. Such relationships built on respect and understanding, early involvement in the mine and business planning underpinned this process (Gawler, 2009a).

Recent signing of a multi-million dollar native title deal in the Pilbara between BHP Billiton and the Nyiyparli people reported by Flip Prior (2012) in the West Australian newspaper will substantially increase BHP-Billiton's iron ore output and, in return, give several hundred Aboriginal Native Title claimants and future generations access to financial consultants, a direct benefits trust and wealth generating measures. The remaining benefits will be placed in a charitable trust to benefit the Pilbara Aboriginal community more broadly through investments in education, training, housing, health and employment, with some set aside for a future fund. The deal also included financial benefits from production from leases granted before Native Title was recognised. This followed on from the multi-billion dollar deal in 2011 between Rio Tinto and traditional owners of four claim groups including the Nyiyparli people offering a fixed-revenue share of iron ore sales, a claim-wide agreement with Hancock Prospecting in 2010 and a contentious claim was settled with Fortescue Metals Group in 2005.

However, notwithstanding such partnerships, it is important not to be seduced into underestimating the complexity of Aboriginal/non-Aboriginal relations in this resource-based industry. The Aboriginal response to the mainstream development focus has been mixed (Altman, 2009). Dominant notions of development that include sustained employment, high incomes and home ownership are often intolerant of cultural differences and support market-based solutions to long-standing Aboriginal

marginalisation (Altman, 2009). There is often an implicit assumption that Aboriginal groups want to embrace the mainstream development model, often presented as offering a superior way of life to their own (Tonkinson, 2007). Mainstream opportunities have been embraced by Aboriginal people, and they have also been fiercely opposed and this polarisation of views reflects the absence of an alternate development discourse where diverse Aboriginal views about development can be heard (Altman, 2009).

High Court decisions, including *Mabo* have moved towards levelling the playing field by recognising Native Title and strengthening the bargaining position of Aboriginal people (Howlett, 2010). Mining companies are now required to become more accountable to Aboriginal landowners in negotiating resource extraction, and competitive advantage has become partially dependent on a company's track record in community relations (Altman, 2009). While agreements between mining companies and Aboriginal landowners on the environmental management of resource projects are now widely recognised, they nonetheless often fail to increase Aboriginal participation, some argue because of the weak negotiating position of many Aboriginal people (Altman, 2009) where a critical component of effective agency in negotiation is knowledge of the policy terrain (O'Faircheallaigh & Corbett, 2005). Others suggest that educational programs whose main aim is to prepare Aboriginal people to work in the mining industry are unlikely to succeed given the complexity of problems facing Aboriginal people and their labour market concerns (Howlett, 2010).

While education and effective Aboriginal agency in the negotiating process are important, over-emphasising their transformative power can deflect attention from analysing the negative effects of neoliberalism that reproduce and entrench already existing inequalities for Aboriginal people (Howlett, 2010; Pearson & Daff, 2010). Objectifying Aboriginal needs in a development paradigm ensures their capture and incorporation so difference is stifled and plurality muted. Rather than reflecting on the taken for granted assumptions about how Aboriginal people 'should' be engaging and maybe why they don't, the question asked is whether there is room for pluralism in this process (Holcombe, 2006). Currently, the hegemonic pro-mining discourse often constrains Aboriginal agency, sometimes constructing their position as anti-development and anti-Australian highlighting structural inequalities including access to resources and political power (Howlett, 2010). Seldom have rules or workplace agreements considered the particular social and economic circumstances of Aboriginal employees (Pearson & Chatterjee, 2010) highlighting the lack of organisational flexibility in responding to cultural difference.

Notions of development are culturally constructed and colonisation, the nature of mines, the value of negotiated benefits packages, and the way Aboriginal people engage with the mine economy influence development outcomes (Altman, 2009). For many Aboriginal groups in WA, preserving their cultural integrity is important. The value system of the Mardu of the Western Desert, many of whom live in the Pilbara, prioritise obligations to kin over accountability to bureaucracies, and arguably, mining companies, whom Mardu see as having no moral claim over them (Tonkinson, 2007). Integral to Mardu identity are values of sharing and compassion reflecting profound and enduring emotional attachments to home, family and country challenging current dominant notions of development (Tonkinson, 2007). Aboriginal landowners see the land and landscape as a cultural asset, not just a commercial one

and want to ensure its environmental integrity whereas the goal of miners to extract the land's non-renewable resources is commercial (Smith, 2003). Research on sustainable development in remote Aboriginal communities suggests that understanding differences between Aboriginal and non-Aboriginal ideas and practices has been integral to the success of development projects, sometimes assisted by local organisations, promoting Aboriginal social, economic and political structures that underpin community development and mediating the often contradictory relationship between the Aboriginal people and external stakeholders (Smith, 2003).

Some Aboriginal groups are increasing their control over resource development though many are not, reflecting the largely hostile legal, policy and institutional environments to Aboriginal interests (O'Faircheallaigh, 2006). Indeed, despite Aboriginal people negotiating to protect the cultural heritage of sites, governments can override any decision and allow mining to proceed without agreement (O'Faircheallaigh, 2006). The dominant development discourse often represents cultural difference as dysfunctional unless it involves positive economic outputs – an easier option that reflecting on and addressing the negative effects of ongoing exclusion and structural inequities that continue to beset remote Aboriginal communities (Tonkinson, 2007) and their participation in the resource boom (Taylor & Scambury, 2005). The legacy of colonisation has neglected the health, education and employment needs of Aboriginal people leaving many unsuitable for employment in the mines (Tonkinson, 2007; Altman, 2009). Unless such structural inequities and historic exclusion are addressed Aboriginal participation rates in the resource industry are unlikely to improve (Taylor & Scambury, 2005).

MINING AND COMMUNITIES

The social and cultural complexities of mining are further demonstrated in and through its differing community dimensions. Mining has long been associated in WA with regional community development, not least around the construction of mining company towns, such as Tom Price and Paraburdoo, arising from WA government agreements with companies mining iron-ore on a large scale in the north of the state in the late 1960s and early 1970s (Layman, 1982; Houghton, 1993). This practice has since given way in WA, as elsewhere in the country, to an increasing reliance on FIFO work practices (Storey, 2001), which have been documented as having significant negative impacts on workers, families and local communities, and on relations across these scales. For example, the wide-spread and increasing adoption of FIFO is argued to have substantially excluded regional and local communities from benefitting from mining while also incurring economic and social costs around the provision of services for FIFO workers (Storey, 2001). Empirical scholarship examining the community effects of mining development and FIFO workforces conducted in Queensland identifies largely negative impacts on “community lifestyle, safety and well-being” just as these communities experience few benefits (Carrington & Pereira, 2011, p. 14). Indeed this study concludes that “The projected cumulative social impact of mining development on rural communities is anticipated to be substantially negative,” in particular when non-residential employees exceed 25% of the workforce (Carrington & Pereira, 2011, p. 18). While there is as yet a limited literature on the ways in which FIFO is affecting host communities, submissions to the 2012 Australian House of Representatives' inquiry into FIFO practises and consequences indicate a range of community concerns which mirror those identified in a study of the social condition of the Peel region which encompasses both host and

source communities. Concerns highlighted by local interviewees included community division and tensions between mining and non-mining residents, a loss of community connection on the part of FIFO employees, while positive impacts on levels of volunteering were also reported (Mayes, 2012).

Aside from these broader consequences of contemporary mining practise, mining operations continue to impact intensely on surrounding communities, which during 'boom' periods can experience rapid and extensive social, environmental and cultural impacts. Local community impacts are often examined in terms of socio-economic factors as exemplified by a recent comparison of 33 small mining towns in WA which measured community wellbeing determined by "unemployment rates; percentage of low income households (less than \$A500 per week); and welfare expenditure per capita per annum" (Tonts, Plummer, & Lawrie, 2012, p. 300). While the findings demonstrate improvements to these socio-economic indicators in small resource dependent communities, the study importantly demonstrates substantial variation across the 33 communities, identifying such factors as the type of commodity, location, and the structure of the mining company as underpinning the heterogeneity of the socio-economic experiences across these towns (Tonts, Plummer, & Lawrie, 2012, p.299). As has also been pointed out, a dearth of detailed research focussing on the wellbeing of Australian resource communities means that it is difficult to be sure of the consequences of rapid growth (Lawrie et al., 2011).

At the same time, qualitative research undertaken by one of the present authors in the form of over 60 interviews with local pre-mine residents in the Shire of Ravensthorpe in WA between 2006 and 2008 identified a range of significant, unevenly experienced, interrelated community impacts beyond changed employment and income levels. This study identified social and cultural consequences highly specific to each of the local communities, just as the impacts are also gendered and classed (Mayes, 2008). Overall, residents reported changing senses of place, loss of community identity and diminished local control, while shifts in equity, community and rurality stood out as significant interrelated aspects of rapid growth (Mayes, 2008,). In addition, this local community bore a substantial emotional cost upon the sudden closure of the mine (Pini, Mayes, & McDonald, 2010) and negative impacts deriving from mining industry employment relations as these were enacted in and by the community not least in terms of the division of labour at both the household and community level (McDonald, Mayes, & Pini, 2012).

In line with voluntary corporate social responsibility trends in the global minerals industry (MCA, 2005) community relations have become a core industry competency (Humphries, 2000). This is due to a range of factors, including a history of adverse social outcomes which tend to outweigh economic benefits, adoption by civil society groups of increasingly effective strategies for publicizing these adverse outcomes, along with industry moves to reduce costs and business risk, particularly in relation to resistance from "host" communities, and a desire to avoid government regulation (Jenkins, 2004; Kapelus, 2002). Along with this, a key change in the mining industry from the 1980s onwards has been the "institutionalization of impact assessment for large-scale mining operations" with attention to social impacts on local communities (Filer, 2002). Concurrently, mining companies in WA play a "central role in local governance, engaging with government and community actors" in providing services and community development programs (Lawrie, Tonts, & Plummer, 2011, p.160).

These shifts are presented by mining companies and industry peak bodies as a means to realising a mining operation's "full potential in contributing to a region's economic and social well-being" (Humphries, 2000). However, while there may be good intentions, and while some benefits do flow to sections of local communities this engagement and outcomes are highly complex (and contingent). For example, corporate involvement in local communities has been critiqued as a way of deflecting criticism and consolidating corporate power, just as it has been shown to constrain the interests of vulnerable groups (Kapelus, 2002; Banerjee, 2007; Mayes, Pini & McDonald, 2012).

MINING: TOWARDS SUSTAINABLE DEVELOPMENT?

The dominant economic story of the mining boom broadly demonstrates that financial and social benefits accrue to some Western Australians. In this regard the sector contributes to sustainable development only in a very narrow sense of the term. The overview of the environmental, Indigenous and community consequences of the rapid expansion of resource extraction in WA demonstrates that these benefits are not only unevenly distributed but are attended by far-reaching, unevenly borne and ultimately unsustainable costs. Further, these consequences are closely and complexly interwoven and generate substantial conflict. The damaging impacts on biodiversity, depletion of water reservoirs, and the cumulative effects of extensive infrastructure including roads and ports extend to quality of life impacts for not only local and Indigenous communities but also WA residents more broadly. Equally importantly, such impacts have much wider reach than the immediate area of a given mine site. The operation of a FIFO mine in the Pilbara, for example, has social, 'everyday' consequences for far distant communities, which contribute to the labour force. Just as the current developmental agenda tends to present the 'boom' as a 'cure' for socio-economic disadvantage, not all communities are affected in the same way. Indigenous communities, for example, are simultaneously excluded and subject to mainstreaming practices, which can reproduce if not entrench existing structural inequalities. Crucially, these consequences which have further racial, gendered, and class dimensions are for the most part poorly understood.

While the mining boom encompasses a diverse array of resource industries, markets and practices, the economic benefits associated with the boom are nevertheless tied to highly volatile and notoriously fickle markets. The sudden, literally overnight, closure of BHP Billiton's Ravensthorpe Nickel Mine in 2008, at the time the largest nickel laterite mine in Australia with an expected 25 year operating life, is a case in point. Similarly, contemporary criticism of the 'high' cost of labour in the face of concerns that the 'boom' is slowing, demonstrates the fragility of economic benefits. The environmental, Indigenous and community consequences as identified here, however, are very real and far less ephemeral.

Mining companies and the state of WA have benefited greatly from increased resource-extraction in response to strong market demand in recent years. The state's resource endowment is expected to provide a solid platform for economic and industry growth for many years to come. However, endowment alone, as suggested by Penney et al. (2012), is not a sufficient condition. Mineral resource production will increasingly be limited by environmental and social sustainability constraints (Prior, Giurco, Mudd, Mason, & Behrisch, 2012). Resource companies' social licence to operate will increasingly determine the future of mining over the coming decades. In

future, such a social licence will require companies to go beyond the provision of financial returns to the community in the form of taxation, employment and philanthropic spending. It was shown here that mining has far reaching direct and indirect impacts on life in WA. It is our contention that it is the effective management of these impacts that will determine the mining sectors true contribution to sustainable development.

Finally, a sustainable resource governance system is required which is attuned to the broader issues surrounding the ‘sustainability of mining’ this paper sought to canvass. The growth and spread of the industry in WA has led to multiple, compounding environmental, social, human and economic impacts in recent years. In this regard, we suggest that the at times rather unproblematic portrayal of mining in WA is somewhat misplaced. We argue the need for proper recognition to be given to the aggregate impacts of mining based on a holistic understanding of the interconnections between mining, environments, Indigenous rights and culture, and communities. Such a governance approach, however, is dependent on the decentring of orthodox, narrow views of development, striking a more equitable balance between people, place and profits and better safeguarding the sustainability of development.

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