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Eureka and beyond: Mining's impact on African urbanisation

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This collection brings separate literatures on mining and urbanisation together at a time when both artisanal and large-scale mining are expanding in many African economies. While much has been written about contestation over land and mineral rights, the impact of mining on settlement, notably its catalytic and fluctuating effects on migration and urban growth, has been largely ignored. African nation-states' urbanisation trends have shown considerable variation over the past half century. The current surge in 'new' mining countries and the slow-down in 'old' mining countries are generating some remarkable settlement patterns and welfare outcomes. Presently, the African continent is a laboratory of national mining experiences. This special issue on African mining and urbanisation encompasses a wide cross-section of country case studies: beginning with the historical experiences of mining in Southern Africa (South Africa, Zambia, Zimbabwe), followed by more recent mineralizing trends in comparatively new mineral-producing countries (Tanzania) and an established West African gold producer (Ghana), before turning to the influence of conflict minerals (Angola, the Democratic Republic of Congo and Sierra Leone).

Keywords: urban, mining, Africa, growth, settlement, migration

The upsurge of mining currently restructuring many national economies in Africa is raising important questions about priorities in natural resource utilisation and the distribution of present and future mining wealth in the countries concerned. Rarely, however, does one read or hear discussion about mining's links with urban growth and settlement patterns and the welfare and indeed rural-cum-urban lifestyle changes involved in people's migration to mining sites. This may be related to the fact that few commentators have expertise or detailed knowledge of both mining and urbanisation. So too, in the mining sites, migration and settlement patterns have a way of changing day by day so unobtrusively that residents take little cognisance of the role they are playing in urban transformation.

The demographic and economic changes related to mining over the 20th century have largely been ignored. Instead, Southern Africa's large-scale mining complexes dominated the literature, with their racially segregated housing and attempts to constrict African urbanisation through a bachelor wage and oscillating migration between miners' rural homes and mine sites. Less controlled, but subject to threats of violence and intimidation, the production of 'conflict minerals' associated with the financing of civil war over the last few decades has generally relied on both coerced and tribute labour, sometimes imported from neighbouring countries, while local people have fled, making their way to the safety of more densely settled urban areas. Racially segregated urbanisation is now history, while conflict mineral exploitation - with its attendant rural-urban displacement - has ended in Sierra Leone and Angola, though it persists in the Democratic Republic of Congo (DRC). By the end of the 20th century, most African governments had adopted neo-liberal economic policies that attracted Western and Chinese mineral investment to the continent.

A new wave of urban growth and settlement experimentation is coalescing, which we refer to here as 'mineralised urbanisation'. This special collection traces various strands of the concept with the aims of: first, understanding the synergies and tensions between the processes of mining development and urbanisation; and second, examining the current sense of 'mining place' in Sub-Saharan Africa.

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The volume draws together the analytical perceptions of 18 scholars from diverse social science disciplines including geography, urban planning, demography, history, anthropology and sociology in addition to cartography and mining engineering. Most authors are nationals of the countries they are writing about. In view of the lacuna in existing literature, each contributor was asked to provide historical background, before focusing on aspects of mining's present day impact on urban growth and welfare in their respective country case studies. As a baseline assessment of the state of play, this Introduction identifies broad historical trends and spatial patterns, providing a platform for the detailed country studies of urban mining localities and urban hierarchies that follow. The first section reviews the dynamics of mining and urbanisation elsewhere in the world. This is followed by a historical overview of African mine-led urban growth and settlement patterns. The third section reviews findings from the case studies with respect to mining's relation to urban systems, growth dynamics, a sense of urban place and the impact of mining on welfare and poverty.

Global mineralised urbanisation: Dynamics and patterns

We define 'mineralised urbanisation' as the influence of mineral production cycles and commodity chains on urban growth and settlement patterns at local, regional and national level. Mineralised urbanisation relates to the force of mining booms and busts on nation-states. Mine-led population movement and investment not only play an important role in the spatial pattern of the national economy, but also influence a country's urban settlement hierarchy either directly or indirectly. Mineralized urbanisation encapsulates the changing national urban profile arising either from the 'direct growth' of mining settlements or the 'indirect growth' of other non-mining urban centres derived from the investment of mining profits (Bryceson and Mwaipopo 2010). Conversely, when mining contracts, changes in the relative distribution of population and work between urban areas or, more drastically, from urban to rural areas, will alter the urban hierarchy.

In general, the initiation of mining activities either creates new settlements in previously underdeveloped regions or enlarges existing ones (Johnston 1982). Capital is attracted by mineral resources offering high returns on investment and labour by the prospect of high wages, relative to other available employment opportunities. Mining settlements also attract various ancillary and supporting services from the supply and hiring of equipment to retail and wholesale facilities and various forms of entertainment and recreation. A key question concerns whether or not mining settlements are able in the longer term to achieve economic diversification into other industries and services, reducing their vulnerability to external demand shocks and supporting long-term sustainability. The relationship between mining and urbanisation is analysed at two primary spatial scales in this section: individual mining settlements and national urban systems. Furthermore, we endeavor to discern the impact of both large corporate mining and artisanal mining on urbanisation. The two forms of mining often exist side by side in a locality, each exerting different migration and developmental dynamics on urban settlements.

Origins and growth of mining settlements as urban localities

Mining settlements can be divided into two main categories: specialised mining settlements or alternatively service or industrial centres whose development has been shaped by trade in mining products (Barnes *et al.* 2001). The former, functioning as "engines of capital accumulation" (Kamete, this volume), are typically characterised by rapid initial growth. They are usually new settlements located in previously rural areas, reflecting the tendency for mineral deposits to be found in areas distant from existing centres of population.

Classically this is illustrated by coal mining towns, which grew rapidly in the industrial regions of the UK and in the North Eastern and Appalachian regions of the US over the second half of the nineteenth century (Morris 1993). These colliery towns generally had the size and density of urban communities, but not their heterogeneity, lacking a range of commercial activities and an elaborate pattern of social stratification (Morris 1986).

The development of mining settlements was more rapid in the American West, where independent miners rather than companies were involved. Most famously, the California gold rush of 1849-53 spurred a massive migration of some 300,000 people from the Eastern US, Europe, Latin

America and Asia (Holliday 2002). The so-called '49ers' lived in mining camps that sprang up around the goldfields, which were notorious for their poor living conditions (Brands 2002).

More recently, the American West experienced a resource boom in the late 1970s and early 1980s. The effects of the rapid economic and demographic changes taking place in mining towns at this time prompted the diagnosis of 'Gillette syndrome', following the experience of Gillette, Wyoming. This malady referred to processes of social and psychological dislocation, manifested in high rates of crime, drug and alcohol abuse, material break down, mental issues and a reduced sense of community (Kohrs 1974). Over time, however, this 'social disruption thesis' has been subjected to increased questioning and criticism on the basis of weak empirical evidence and over-generalisation from single industry case studies (Lawrie *et al.* 2011).

Two key themes emerge from subsequent research: the need to take account of the mining resource cycle or 'resource roller coaster'; and the importance of local circumstances (Wilson 2004). One longitudinal study of four mining communities in Utah and Wyoming that had experienced rapid growth in the late 1970s and early 1980s mining boom revealed social disruption to be place and time-contingent, with a follow-up survey in 1995 identifying improvements in social integration, trust and community satisfaction, alongside reductions in the fear of crime (Smith *et al.* 2001).

Specialised mining towns can be distinguished from larger cities in which mining has been an important source of urban growth. Prominent examples of the latter include San Francisco and Melbourne. San Francisco served as the main supply base for the Californian gold rush, transforming it from a remote outpost of a few hundred people in 1848 to a burgeoning town of 50,000 by 1853 (Brands 2002). It grew into a major metropolis as resource extraction and commerce generated large concentrations of capital, becoming the second largest financial centre in the US by the early twentieth century (Walker 2001). In contrast to specialised mining towns, metropolitan centres like San Francisco developed a greater financial and entrepreneurial capacity, which enabled them to grow as vital nodes for the co-ordination and control of successive waves of capital accumulation.

Global illustrations of mine-influenced urban systems

Here, the Australian experience is of particular interest, given its heavy economic reliance on mineral wealth and vast semi-arid terrain. The mineral boom began in the 1840s with the discovery of silver and copper, but it was the discovery of gold in New South Wales and Victoria in 1851 that launched large-scale migration to Australia and propelled a surge in urbanisation, with Australia becoming one of the most urbanised countries in the world by the beginning of the 20th century (Lavery 1983).

Mining drove the growth of numerous smaller towns towards the base of the urban hierarchy, but also contributed to the expansion of major secondary centres in the form of industrial centres and provincial capital cities. Many of the smaller mining towns remain highly specialized and vulnerable to external demand shocks, although some of the larger centres, such as the gold town of Kalgoorlie in Western Australia, have achieved a degree of stability (Lawrie *et al.* 2011).

Most recently, the adoption of so-called 'fly in, fly out' systems whereby labour is flown in on a weekly basis to remote regions such as the Pilbara in Western Australia (Lawrie *et al.* 2011; Storey 2001) fosters a process of indirect urbanisation since some of the urban development effects take place in workers' towns of residence in addition to the mining towns themselves. In particular, this has reinforced the growth of Perth as the primary regional service centre and, to a lesser extent, Melbourne, which has been the centre of corporate control in Australian mining since the 19th century Victorian gold rush (Tonts and Taylor 2010, 2656).

Turning briefly to Latin America, silver mining was foundational to the economic and spatial organisation of the Spanish empire. Mines catalysed growth of the largest urban centers in the Americas (Dore 2000). The city of Potosi in present-day Bolivia was founded on silver mining, attaining a population of over 200,000 people at the turn of the seventeenth century. Moreover, cities such as Lima, Panama, Vera Cruz and Havana owed their growth to their positions on the official trade route from the mines to Spain, while Buenos Aires became the focus of the contraband silver trade.

Mining development in Latin America is also associated with the growth of secondary and regional cities in remoter areas. In the latter half of the 20th century, Latin American governments sponsored major resource-based growth pole projects to develop remote regions, spurring the

transformation of the Amazon region. Alongside large-scale state-led mining projects, Amazonia experienced an influx of artisanal prospectors or *garimpeiros* as part of a massive gold rush after a rise in the gold price in 1979, fuelling the rapid urbanisation of the region (Godfrey 1992).

Urban developmental processes in Sub-Saharan Africa: Tracing mining's influence

While it is often remarked that Africa is the world's least urbanised continent, it should not be forgotten that archaeological evidence and explorers' accounts testify to the historical existence of densified populations on the African continent that rivaled the size and sophistication of European towns of the time (Anderson and Rathbone 2000; Freund 2007).¹ Coquery-Vidrovitch (2005) enumerates several necessary pre-conditions for historical delineation of urban settlement, namely: adequate staple food supply, trade and concentration of political authority, a specialised division of labour, class differentiation as well as money and monumental buildings.

We define urban settlements as populations of 10,000 people or above which are ethnically diverse, engaged in varied specialised economic activities rather than depending primarily on agriculture, and stratified by class in terms of different levels of income earning, asset holding and political power. In the early post-colonial decades, a number of typologies of African towns and cities were elaborated on the basis of the towns' economic functions, cultural features and political classifications (Vennetier 1976; O'Connor 1983). For purposes of comparing the nature of urban mining as opposed to urban non-mining settlements, our preference is for a simple four-fold classification that distinguishes functional origins and developmental dynamics, namely: centres of centralised power of state or religious authorities providing administrative governance; second, trade and transport centres, notably shipping ports and railway hubs; third, centres of industrial concentration; and fourth, mining settlements, which some might consider as a subset of industrial centres, but their dependency on non-renewable mineral resources imparts a distinct form of temporality. Furthermore, the complex, bifurcated influences of artisanal as opposed to large-scale mining distinguish them further. In reality, urban settlements almost invariably are a blend of more than one of these four categories. However, for analytical purposes, it is helpful to disaggregate by function to perceive the varying character of mining settlements, thereby facilitating the periodisation of urban growth and settlement patterns historically into three main eras delineated below.

Empires, kingdoms and city-states: Impetus of ancient long distance gold trading

Mineral production and trade have had a significant influence on Sub-Saharan African urbanisation through historical time. Early urban settlements were generally associated with centralised kingdoms and/or important trading nodes for highly valued commodities including slaves, ivory and minerals, notably gold. Centres of religious and political authorities often merged. Early archaeological evidence of urbanisation exists along the Middle Nile at Meroë, the capital city of the Nubian kingdom of Kush from around 500 BCE to the fourth century CE (Welsby 1996). It is believed that the urban economy thrived on a rich array of exports including gold, ivory, ebony, semiprecious stones and exotic animal skins and feathers that were traded with the Hellenic city-states of the Mediterranean (Coquery-Vidrovitch 2005). The rise of the Roman Empire, however, destabilised Kushitic urbanism. As the Mediterranean was reconstituted under Roman domination, trade between Europe and Africa shifted to the East African coastline.

The ancient period also witnessed the development of major urban mining and mineral-trading centres up-country. Monumental buildings and archaeological evidence of a large population concentration are found at Great Zimbabwe dating from the 11th to mid 15th century, closely associated with gold production. The gold was channeled into an Indian Ocean trade circuit with its main entrepot in Kilwa (on the coast of present day Tanzania) between the 12th and 15th century and further south in the smaller ports of Ibo, Mozambique Island and Sofala in Mozambique (Bryceson *et al.* this volume). The towns declined in response to a diminishing supply of gold and the Portuguese ascendance as an Indian Ocean trading power in the 16th century.

Similarly, Timbuktu (in present day Mali) has an illustrious history as a centre of long distance trade and Islamic learning built upon commerce in gold and slaves. It coalesced as an urban locality in the 12th century with the spread of Islam, attracting a cosmopolitan population composed of many

ethnic groups. More generally, the Niger River region was famous for its large metropolitan cities including Gao, capital of the Songhai Empire and Jenne, the Middle Niger delta's commercial centre (Saad 1983).

For centuries, alluvial gold produced in Ghana was traded along trans-Saharan routes destined for the towns of the Niger River (Gough and Yankson, this volume). The appearance of Portuguese traders in 1471 for gold and slave trading spurred gold reef mining. By the 1670s, as Timbuktu collapsed, and Portuguese trade monopoly on the coast was superseded by competition between Dutch, Danish and English traders, considerable quantities of gold from Begho were directed southwards to the Atlantic coast, becoming an important catalyst for the rapid rise of the Ashanti (Asante) kingdom in the latter part of the 17th century (Wilks 1993).

Colonial period: Large-scale mining's imprint on urban Southern Africa

After the European scramble for Africa, economic and political influences took on new directions. The colonial governments structured their urban policies towards: first, limiting urban growth with the intention of keeping Africans in their rural home areas; second, facilitating labour control of African migration to the city (Rakodi 1986); and third, segregating the races spatially within the city, using byelaws and the *cordon sanitaire* under the pretext of ensuring European public health (Swanson 1977). Urban areas were, in effect, conceptualised as an alien environment that would contaminate individual Africans and corrode the communal fabric of tribal Africa. Their stated aim was to preserve the African agrarian way of life as illustrated by Felix Eboué, governor-general of French equatorial Africa in a circular dated 1941 who argued for: "the fixation of the African on the soil...in the midst of collective traditional institutions" (cited in Cooper 1996, 156)

The South African government and neighbouring colonial governments applied this thinking in the context of labour control for the expanding Southern African mining economy (Jeeves 1985; Mabin 1986; Moodie 1994; Harries 1994). During the latter half of the 19th century, colonial attitudes towards African urban settlement and residential accommodation for mining labour were closely entwined and codified in an urban racial segregation model that evolved in its most extreme form in South Africa. Given the importance of the segregation model for understanding the impact of mining on African urbanisation during the 19th and 20th century, it is worthwhile examining how it emerged.

The victory of the white settlers over the native Xhosa people in the "last frontier" war of the late 1870s increased the number of Africans under colonial jurisdiction and crystallised a rationale for construction of a "cheap labour reserve" (Kirk 1991). Many Europeans increasingly favoured withdrawing voting rights for propertied and employed Africans in the city to clear the way for the imposition of a comprehensive "native policy" for Africans regardless of their class standing (Ibid). Pass Laws and the Native Urban Areas Act of 1923 controlled the "night residence" of Africans in urban areas. Apartheid legislation in 1952 added a battery of controls, with labour bureau directing African workers to white employers

Shedding light on how mining capital and the state shaped racially delineated space in South Africa's urban areas, Wolpe (1972) argues that male miners' low wages, short-term labour contracts and circular migration between their rural homes were posited on retaining the viability of the pre-capitalist mode of production. Miners' wives and children remained in the countryside relying primarily on subsistence agriculture, in effect subsidizing corporate capitalist mining operations.

Mabin (1986) provides a valuable account of the closed mining compound model following the discovery of diamonds at Kimberley in 1869. Initially, diamond digging was pursued by large numbers of independent white small-scale claim holders. Blacks were not eligible to hold claims and were therefore restricted to working as hired labour; with their settlement dispersed and unplanned. The creation of the closed compound system only emerged at the Kimberley diamond mines in the 1870s. There was a meeting of minds that Africans should be segregated to facilitate control and to preclude "black political dominance in the future" (Swanson 1977, 313).

At the early artisanal mining stage, the population at Kimberley reached 50,000. However, labour unrest and a decline in the diamond price resulted in diamond merchants seizing the opportunity to buy up claims. Concentration proceeded rapidly thereafter. By 1888, De Beers was only one of two large companies left, achieving a monopoly in 1889 (Mabin 1986).

As diamond production concentrated and mine shafts deepened, the pattern of diggers living close to their claims became obsolete. Open pit mines required increasing numbers of hired labourers. With growing concern over unrest in a multi-racial labour force and diamond theft, company managers began to favour building barracks alongside their pits to facilitate labour segregation and supervision. In 1884, De Beers took the lead in procuring cheap convict labour that they housed in closed compounds, which proved profitable and was thereafter followed by a closed compound for free labour (Ibid).

Kimberley nonetheless had large numbers of laid off and unemployed Africans who remained in the town in numbers roughly on a par with those of the black miners living in compounds. De Beers found their presence useful as a labour reserve, and the town's African housing became increasingly over-crowded as time progressed. After the Native (Urban Areas) Act of 1923 was passed, blacks were gradually forced to move into what became segregated, state-funded, municipally controlled housing. Both the mining compound and the segregated black townships became models for black urban residential housing in Southern Africa (Ibid).²

Gold mining on the Witwatersrand started in 1886, expanding rapidly to embrace a black mining labour force of 200,000 by 1910 (Jeeves 1985, 3). Thirty years later the total was 300,000, and by 1985 roughly 500,000 (Moodie 1994, 1). As Harrison and Zack (this volume) document, the foundations of Johannesburg were built on the Rand's gold mining operations. Johannesburg encapsulated South Africa's economic opportunities, contractions and racial oppression more than anywhere else, particularly in the apartheid period.

The implementation of the South African state's apartheid policy from 1948 onwards came at a time when the foundations of the national economy were shifting from gold and diamond mining to manufacturing and secondary industry (Wolpe 1972). Apartheid went beyond segregationist labour control and efforts to deflect the black population from urban settlement by seeking to establish a new system of nominally self-governing or 'independent' Bantustans in pre-existing and consolidated 'reserves'. Forced removal of surplus labour from the towns and white farms into the Bantustan reserves added to rural impoverishment. Meanwhile, segregated African townships were enforced by heavy investment in state security and police controls, setting in train a vicious cycle of black resistance and white repression.

In his article in this volume, Hugh Macmillan contextualises the Southern African historical debate about the relative costs of providing family wages and housing as opposed to low bachelor wages in the face of the inevitable dwindling supply of minerals. While South Africa witnessed the implementation of apartheid during the 1950s and 1960s, Northern Rhodesian (Zambian) copper mining firms invested in raising the productivity of their labour force with the provision of durable family housing and urban infrastructure as documented by Patience Mususa (this volume). Migrant workers to the Zambian Copperbelt were initially housed in camps, which had evolved into mining towns by the 1930s, accompanied by colonial administrative centres. In the 1950s and 1960s, living standards improved as a result of the colonial government's encouragement of trade unionism and the paternalistic approach of the large mining companies.

Post-colonial period: Mineralising processes embedded in new urban social orders and disorders

As the wave of African national independence unfolded in the 1960s and 1970s, the racist constructs of the colonial division of labour were quickly dismantled. Capital cities of the newly emerged African nations attracted the main streams of urban migrants. The administrative and service sector positions that had been occupied by whites were Africanised. Family wages and salaries brought women migrants to the city in large numbers evening out the sex ratio (Bryceson 1980). Most African countries' economies were based on agricultural exports, mainly produced by smallholder peasants, at a time in the 1960s when world agricultural commodity prices were high, favouring newly independent economies. One notable exception is Botswana, a Southern African country sparsely populated by agro-pastoralists, which experienced the windfall gain of diamond discovery at independence. As Thando Gwebu (this volume) describes, the government was sensitive to spending its financial resources judiciously from the outset.

In South Africa, the racial foundations of apartheid were attracting global protest and were challenged by domestic dissent regarding the black population's "right to the city", directed at the

inequities of black township relocations such as Soweto in Johannesburg and District Six in Cape Town. Increasing perforations in the circular migration system between home and mine appeared (Moodie 1994). During the mid-1970s mineworkers' wages started rising. Miners' union membership was accepted by the major gold-mining companies and some semblance of family reconstitution between female rural-based wives and male miners occurred through the migration of women to peri-urban areas of mining settlements following the repeal of the pass laws in 1986. At much the same time, by the 1990s, retired miners were sometimes opting not to return to their rural home areas and families, lacking sufficient capital to enjoy their status as male elders (Bank 1999).

In many parts of Sub-Saharan Africa, mining has become a source of conflict, reflecting the often irreconcilable claims of different groups for control over mineral wealth. Conflicts have multiplied in recent years as mining operations have expanded, often pitting mining corporations or the state against communities. At regional and national levels, liberation movements or rival groups fighting for territorial annexation and political power may seek control over mineral exploitation to further their cause (Le Billon 2001). According to Buijtenhuis (2000), peasants' wars directed at achieving African nationhood were eclipsed by predatory wars, where rival militarised groups sought state power, notably in Sierra Leone, Ivory Coast, Liberia, Democratic Republic of Congo (DRC) and Angola. Mkandawire (2002) observes that rebel movement leaders increasingly have urban origins, with a tendency to choose roving rather than stationary military tactics due to lack of support from local rural peasantries. They targeted rich diamond areas, displacing the peasant farmers in their way. It is telling that minerals were not at issue in Mozambique's national liberation movement in the 1960s and 1970s, compared with Angola's and Sierra Leone's experience of civil war in the 1990s when 'blood diamonds' were used by rebel movements to fund conflict against established national governments (Rodrigues and Tavares; Maconachie, this volume). Finally, conflict can also arise between large-scale mining operations and artisanal miners with the expansion of the former sometimes resulting in the displacement of the latter (Emel *et al.* 2011; Gough and Yankson, this volume).

De Boeck's (1998; 2001) in-depth analysis of Congolese diamond smugglers' and diggers' forays into Angola reveals how the illicit trade in artisanal conflict minerals spurred rapid growth in a number of small towns, across the border in the DRC, considerably distanced from the country's older diamond centre of Mbuji Mayi, discussed by Patience Kabamba (this volume).³ As Cristina Rodrigues and Ana Paula Tavares (this volume) document, much of Angola's urban growth pattern during the civil war depended on shifts in the fortunes of the government's MPLA military forces versus UNITA. For the most part, the Angolan rural population of the Lundas attempted to seek safety in MPLA-held territories, while Congolese youth and Angolans from other parts of the country took the risk of migrating to UNITA-held areas of the mineral-rich Kwango River. Similarly in Sierra Leone, Roy Maconachie (this volume) recounts how rebel forces depended on artisanal diamond production, based upon youth labour recruitment (Le Billon and Levin 2009; Richards 1996). Most of the diamond-producing sites in very remote forest areas along rivers served as clandestine strongholds. However, the atrocities that the youth were ordered by their commanders to commit against the local society, sometimes against their kin and neighbours, caused estrangement if not a pariah status (Richards 1999). When hostilities officially ended in 2002, droves of the approximately 200,000 artisanal miners (Le Billon and Levin 2009) migrated to the capital city, swelling its population and posing a potential security threat. As Maconachie notes, their subsequent return to their rural home areas marks a dramatic development. In a spirit of physical and spiritual recovery, most have been welcomed rather than shunned, and availed agricultural land to make a new start (Richards 1996; Peters and Richards 1998).⁴

Africa's new mining boom: 2000 and beyond

Metals such as aluminum, copper, nickel, zinc, and gold have experienced rapid price increases in recent years 2003 (Lawrie *et al.* 2011), with gold prices soaring by over 600% since 2001 to a record high of US\$1,911 in August 2011, driven by investors' quest for a safe haven amidst financial crisis and recession (Blas 2011). Such price increases reflect the underlying volatility of commodity markets, following a prolonged period of price depression in the 1980s and 1990s (UNCTAD 2007),

fuelled by speculation in financial markets and a new geography of demand with the growth of China playing a particularly important role.⁵

These price dynamics promise an unprecedented bonanza for four main sets of actors: the corporations who produce and sell the commodities, artisanal miners and the governments and populations of the countries in which the mineral wealth is located. For resource-rich developing countries, the new mining boom promises new development opportunities, seeming to reverse the historic decline in the terms of trade between their commodity exports and the manufactured goods and service of developed countries (Freudenburg 1992). Yet, given the notoriously asymmetrical nature of the relationship between transnational mining corporations and local communities, the boom over the long run may only serve to accentuate the contradictory role of mining as a vehicle for economic and social development (Bebbington *et al.* 2008).

This commodity boom follows the widespread liberalisation of mining codes in developing countries during the 1980s and 1990s, as part of a broader programme of economic and financial reform promoted by the World Bank and other international financial institutions (IFIs) (Bridge 2004). Based on comparative advantage and a sectoral approach to mining, the codes were designed to generate greater export earnings and attract foreign investment, privileging this approach over the adoption of an integrated development strategy with distributive goals (Campbell 2008).

Early indications are that the liberalisation policies are already favouring the interests of foreign capital over domestic interests and the artisanal mining sector⁶ (Emel *et al.* 2011; Hilson and Potter 2005). The relationship between the mining corporations and governments seems to have become more asymmetric (Bridge 2008). Liberalisation measures, which pointedly sought to reduce the role of governing states, have often undermined development capacities, making future reforms aimed at re-orientating the mining sector towards developmental goals more difficult (Campbell 2008).

The new mining boom serves to refocus attention on the resource curse thesis (Bridge 2008), which holds that reliance upon the exploitation of mineral resources is associated with poor economic performance. Critics can point to impending signs of ‘Dutch disease’ whereby mineral wealth pushes exchange rates and wages upwards, crippling the performance of non-mineral sectors such as agriculture and manufacturing and creating an enclave economy divorced from other economic sectors.

Various commentators cite the failure of mining in poverty reduction (Freudenberg and Wilson 2002; Ross 2001). This is acknowledged by the mining industry itself, which tends to attribute the blame to the weak governance capacities of states, maintaining that mining remains good for economic growth (Bebbington *et al.* 2008). The lack of governance capacity reflects the neoliberal reforms of the 1980s and 1990s that reduced the role of the state and adopted a narrow sectoral approach to mining as a source of export revenue and a magnet for investment (Bryceson 2006; Campbell 2008).

In response to the negative effects of the resource curse thesis, IFIs have in recent years advanced what Arellano-Yangas (2008) calls a ‘new natural resource agenda’ that emphasises: decentralisation of government; greater citizen participation in decisions on how to spend mining revenue; and partnership between state agencies and mining companies. Time will tell how seriously IFIs and, most importantly, African national governments pursue these aims over the course of the mineralisation of their economies.

Case studies of urban mining settlements in transformation

Framed by the preceding discussion of international patterns and processes and the schematic history of African urbanisation presented above, we now turn to mining and urbanisation trajectories in sub-Saharan Africa considered in the case studies that follow. Our case study countries represent a range of national experiences arising from different temporal points of entry into mining, different configurations of artisanal and corporate large-scale mining, and different minerals. Gold and diamonds repeatedly surface as the key minerals, but copper (Zambia and Zimbabwe), chromite (Zimbabwe), uranium (Botswana), and other industrial minerals are included. Table 1 schematically indicates the range of case study diversity. While “expanding” and “contracting” mining sectors are self-explanatory, “transitional” refers to circumstances in which mining is adjusting to new circumstances be it a post-war situation, renewed investment or a new stage of the mining cycle.

Table 1: Thematic listing of case study mineral-producing countries

Stage of Mining:	Form of Mining:		
	<i>Large-scale</i>	<i>Large & artisanal</i>	<i>Artisanal</i>
Expansion		Tanzania, Democratic Republic of Congo (DRC)	Zimbabwe
Transitional	Zambia, Botswana, Angola	Ghana	
Contracting	South Africa, Zimbabwe	Sierra Leone	Angola

Mining and urban systems

How mining shapes urbanisation at the level of national urban systems as well as within individual urban settlements in Africa is a relatively unknown arena. Obviously, mining attracts migrants with the expectation of more remunerative livelihood opportunities, but the question of how people move to, settle in and sustain a livelihood in the face of the roller coaster of global mineral markets remains largely unanswered (though see Rajak 2012; Walsh 2012). From recent observations of the current mining boom, settlement patterns of artisanal and large-scale mining differ temporally, spatially and infrastructurally. Artisanal mining tends to appear first and is most often associated with the rapid growth of small towns and regional centres, which commonly wanes as the mineral supply is depleted or unreachable with artisanal technology (Jønsson and Bryceson 2009; Bryceson *et al.*, this volume). Large-scale mining, on the other hand, is likely to support larger *in situ* urban settlements as well as contributing to the growth of capital cities and service centres (Tonts and Taylor 2010).

At the time of South Africa's dramatic transformation into a country dominated by mining, the port cities of Cape Town and Port Elizabeth were the most populous urban settlements. By 1900, Johannesburg's growth had overtaken both of those settlements, and it has retained its supremacy; although Durban and Cape Town are a close second and third.⁷ Considering South Africa's largest cities, one would therefore assume that urban primacy is not pronounced in South Africa (Figure 1). However, Johannesburg and Pretoria, the South African political capital, have been administratively conjoined since 1994 in the new Gauteng province, which also includes Ekurhuleni, comprised of a string of former Rand mining towns.⁸ The name "Gauteng" derives from the Sesotho word for gold, *kgauta* (possibly derived from the Afrikaans word, *goud*), and the locative suffix –eng, and means 'place of gold'. In effect Gauteng forms an extended urban megalopolis with a population of 8.8 million people during the 2001 census (almost 20% of the South African population). In this context, South Africa represents a case of extreme urban primacy in which the political and economic capitals have merged with local municipalities to form one enormous urban conurbation derived from gold mining.

Zambian towns are quite different. Out of the country's eight most populous urban settlements after Lusaka, six are or were originally mining towns; five are located in the Copperbelt⁹ as well as zinc and lead-producing Kabwe. As Mususa (this volume) documents, declining copper prices have spelled misery for Copperbelt residents, resulting in the contraction of Copperbelt towns, while Lusaka grew (Figure 1). Thus, contrary to the tendency for capital cities' urban primacy to decline in the decades following national independence, Lusaka gained primacy, as observed by Macmillan (this volume).

In Botswana, Gwebu (this volume) traces how urbanisation has been dominated by large-scale mining, providing the economic basis of most major towns outside of the capital city, Gaborone. Similarly, Amin Kamete (this volume) documents how mining has exerted a strong influence on urbanisation in Zimbabwe, underpinning the growth of numerous urban centres, although the country's two largest cities, Harare and Bulawayo, are not directly associated with rich mineral

deposits in their immediate vicinity. Nonetheless, the concentration of corporate headquarters has contributed to the growth of Harare, although urban primacy has been on the decline since independence in the 1970s (Figure 1).

Bryceson *et al.* (this volume) show that small towns in Tanzania’s mining districts have grown more rapidly than those in non-mining regions during the 1980s and 1990s, especially south of Lake Victoria in the so-called “ring of gold”. This is likely to have contributed to Dar es Salaam’s declining urban primacy (Figure 1). In Ghana too, Gough and Yankson (this volume) indicate that mining has contributed largely to the growth of secondary centers and smaller towns.

Kinshasa’s urban primacy in the DRC is very striking, dwarfing Lubumbashi, the country’s second largest city. It is noteworthy that the next eight towns in the urban hierarchy are in areas of mineral wealth, including Mbuji Mayi.¹⁰ Similarly, in 2004 Freetown’s population was over five times that of the second largest city. Its primacy continually increased during the civil war and has only now started to abate in the post-war period. Finally, Angola, like Mozambique, had an urban colonial heritage, which accorded primacy to the capital city Luanda and thereafter was fueled by the disruptions of civil war that caused people to flee to Luanda, as explained by Rodrigues and Tavares (this volume).

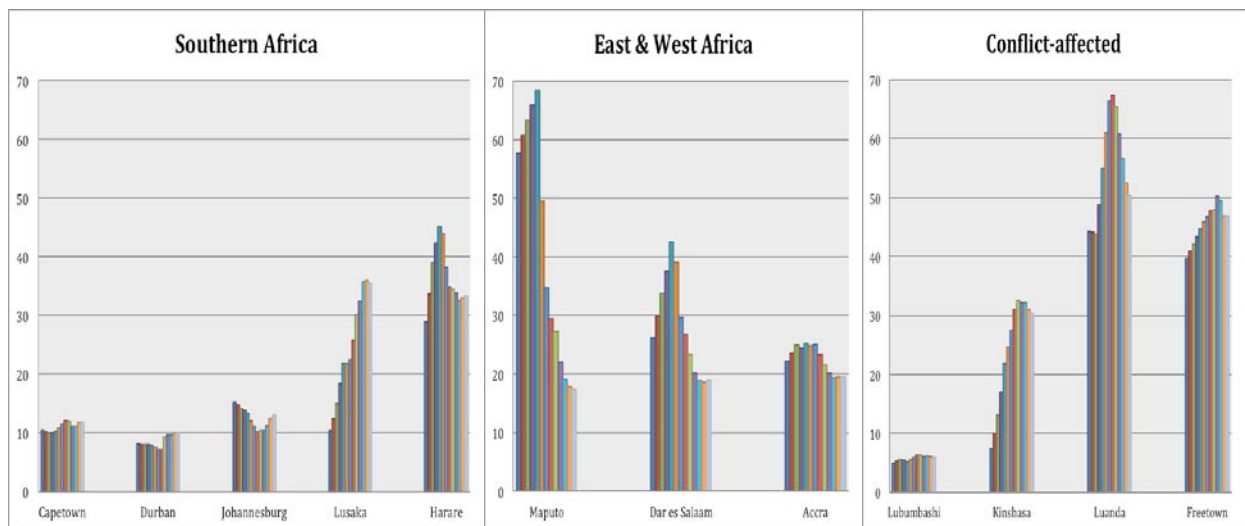


Figure 1: Urban primacy patterns (percentage of total urban populations), 1950-2010).

Source: United Nations Population Division, 2004.

Mining settlement and growth dynamics

At a more localised level, mining has given birth to urban centres as well as propelled their growth over the past two decades of neo-liberal policy implementation. The current global mining boom is fuelling new patterns of settlement in and around key ‘rush’ sites as exemplified by rapid in-migration to mine strike sites in Tanzania (Bryceson *et al.*, this volume). The pattern of initiation, growth and decline typically experienced by mining towns has a cyclical character driven by the interaction between resource availability and exploitation, capital accumulation, infrastructure development and labour and population flows.

Bryceson and Jønsson (2010) provide a stylised account of the process of settlement for Tanzania. In the pre-phase, minerals have yet to be discovered or have been discovered but mined by only a few local people who still rely primarily on agricultural production. This state can go on indefinitely but rising global mineral prices trigger the first mining phase, which is characterised by a rapid influx of artisanal miners; closely followed by a second phase, involving a wave of non-mining migrants to work in trade and services. Their combined, multi-skilled in-migration effects urban transformation. The sex ratios of the settlement equalise as local economic multipliers develop alongside increasing mineral production. Eventually, this gives way to a third phase whereby miners’ labour reaches a stage of diminishing returns, when mineral extraction becomes too difficult and

costly in the light of available technology and international demand conditions. These circumstances reduce the rate of in-migration leading to Phase 4 when the rate of out-migration exceeds the rate of in-migration.

A related pattern is that of artisanal mining displacement that is most likely to occur as a settlement passes from the second to third phase. The mineral supply is still very rich but digging has descended to a depth that artisanal miners cannot reach with their technology. This often leads to the expansion of large-scale corporate mining, more often than not under foreign ownership, management and control. Global interests supercede local interests. This is a critical point for contestation (Hilson and Yakovleva 2007). Many African governments are too inexperienced, weak or corrupt to broker deals to ensure sufficient benefits for the local mining population and the region and country at large.

As mining towns grow, their economic character evolves. Harrison and Zack's article (this volume) centres on Johannesburg, tracing its transformation from a mining camp into the primary mining-based metropolis in Southern Africa. The scale of the gold industry around Johannesburg meant that it exerted major 'backwash' effects on neighboring countries in Southern Africa and beyond by drawing in foreign labour, in addition to the South African workers who were subjected to coercive methods or recruitment.

Gough and Yankson (this volume) describe how modern gold mining in Ghana expanded greatly in the so-called 'Jungle Boom' of 1901-1902, with urbanisation occurring along the south coast where maritime trade was centred and the main mineral resources located. Mining not only continued to support the development of established towns such as Obuasi and Tarkwa, but has also fuelled the growth of new settlements in the Northern region based on open-cast extraction of gold by artisanal miners (Hilson and Ackah-Baidoo 2011).

Maconachie (this volume) traces the growth of diamond mining in Kono district in the Eastern Province of Sierra Leone starting with large-scale in-migration in the 1940s and 1950s. Crucially, this process encouraged the growth of agriculture, retail and other services to supply the mining population, particularly in burgeoning towns such as Kenema and Koidu.¹¹ Since the cessation of the civil war, artisanal mining has declined as alluvial diamond deposits have become increasingly worked out, in many cases spurring a return to agriculture.

In the DRC, on the other hand, agriculture and mining have different regional trajectories. In Butembo's rich agricultural environs, commercial production of coffee and subsistence food production have continued whereas agrarian options in Mbuji-Mayi are unlikely to be looked upon with much favour (Kabamba, this volume). Parks (2011) expresses doubt about smallholder agriculture's potential as an exit option in many mining areas of the DRC given artisanal miners' loss of agricultural skills, land access and the relatively poor remuneration from farming compared with what they have grown accustomed to in mining. Those facing dwindling income from depleting pits are more likely to seek trade and service opportunities.

In Zambia, Mususa (this volume) identifies a transition from mining to agriculture, which is primarily *in situ*. The unexpected opportunity that the government-owned mines offered to laid-off workers to buy the houses they had occupied while working helped to stave off migration to Lusaka and elsewhere. Those who made the house purchases thereafter tended to try to make ends meet by turning to agriculture, hence her observation that the towns have become like villages.

In Zimbabwe, the same issue arose, but the availability of mine housing in the face of a mineral slump coincided with traumatic displacement through an urban "clean-up" campaign in Harare and other towns, which affected approximately 700,000 people. The impact was compounded by 300,000 African farmworkers' evictions from white-owned farms. Kamete (this volume) shows how mining company "ghost towns" became the refuge of the displaced from these campaigns, particularly foreign workers who had no rural home areas to return to in Zimbabwe. Their housing problem was addressed but viable livelihoods remained a struggle. Many turned to very low paid sub-contracted mining. Poverty and hunger reached levels necessitating the distribution of food aid.

Sense of urban mining place

Here, we dwell on two main characteristics of urban mining places: their cosmopolitanism and their temporality, which tend to mark them as distinct from other urban sites within the nation-state. Cosmopolitan mixing of people from a wide array of ethnic groups is one of the defining features of

urban life. But it is not the mere physical co-existence of multi-ethnic people that matters. As Appiah (2007) argues, the ‘diversity principle’, a pervasive acceptance of ethnic diversity open to relational ties and moral responsibility regardless of ethnic origins is vital to urban social coherence. Key here is the interplay between individual urban identity formation and the congealing urban social collectivity over time.

Artisanal mining, operating at lower levels of remuneration, provides more labour absorption generally, giving rise to far larger numbers of urban migrants than large-scale mining with its greater capital. Artisanal mining settlements tend to be embryonic cosmopolitan locations from the moment of their origin, especially at mineral rush sites where miners from near and very far away amass. Artisanal mining sites in Tanzania and Ghana have been noted for their ethnic diversity with a considerable sprinkling of foreign nationals as well (Jønsson and Bryceson 2009; Gough and Yankson, this volume). Artisanal mining by its very nature of involving groups of people in collective work of an uncertain and dangerous nature demands trust. Bryceson and Jønsson (2010) found that outside of miners’ first apprenticeship mining site, Tanzanian artisanal miners judged each other on the basis of mining skills and competence instead of place of origin and tribal affiliation.¹²

By contrast, the Southern African mining compound model operated largely on the basis of tribal groups. Mine companies recruited widely within Southern Africa, but recruitment practices, work teams and residential arrangements divided men along ethnic lines. Senior men acted as “boss boy” team leaders in the mines and the *indunas*, management-appointed black supervisors, were charged with keeping order in the compound (Moodie 1994). The localisms of speaking a South African vernacular language, traditional tribal values and a sense of rural home were more likely to persist in such settings.¹³ Already in the 1910s, South African mines sought to recruit so-called ‘tropical’ labour from Malawi and Mozambique (Jeeves 1985). Mine management and South African government’s divide and rule tactics made for fractious work relations amongst different ethnic groups and between South Africans and foreign nationals rather than harmonious cosmopolitanism (Moodie 1994). In the new South Africa, these labour practices have been abandoned but one need only look at post-apartheid South African censuses to see the delineation of ethnic, race and language groups still meticulously recorded as essential components of municipalities and the nation state.

In the historical Southern African model of urban deterrence, the mining camp, compound and township were residential constructions moulded to racially restrict Africans from permanent urban settlement. As Macmillan (this volume) points out, there has been a long and ongoing debate about whether Africans were surmounting these restrictions and permanently settling in urban areas, claiming their right to the city as urban residents, or maintaining a pattern of temporary, circular migration and persistent links with the countryside (Gluckman 1961 Mabin 1989; Ferguson 1999; Potts 2010).

South African census statistics indicate that racial segregation and apartheid may have slowed, but not stopped, the process of African urbanisation. Growth rates for African populations in urban areas exceeded that of whites from the 1920s onwards (Beall *et al.* 2006). Tellingly, Southern African mining countries had higher levels of urbanisation than elsewhere on the continent by the 1960s. Urban growth, permanent African urban settlement and what colonial regimes referred to as “detrribalisation” progressed, despite the system of rigid controls designed to preclude them. Gradually, the sex ratio equalised as women found ways of moving close to the mines where their husbands worked (Moodie 1994).

In Northern Rhodesia, bachelor wages and circular migration were replaced with family housing and wage packets at the mines, though not until the late colonial era. Family formation and reunion were at last sanctioned. Mususa (this volume) describes the Copperbelt’s investment in housing and infrastructural building. Alongside the bricks and mortar of African family dwellings, residents were constructing urban mining identities, cosmopolitan cultural styles and new community values. As those permanently settled had families and raised their children in the urban context, rural idioms sometimes became quaint. Nonetheless, some second and third generation residents of the Copperbelt were forced to resort to the agricultural livelihood of their rural forefathers in the dark days of recession during the late 1990s, as some parts of the Copperbelt became “like a village”.

These experiences reveal how a sense of urban mining place necessarily entails the flexibility to adapt to minerals’ global price fluctuations as well as the inevitability of declining mineral supplies as non-renewable resources. This is true for large-scale mining towns as well as artisanal mining

settlements. In Botswana, as the copper-nickel deposits in Selebi Phikwe became uneconomic to exploit, the government endeavoured to bring about an industrial and commercial transformation of the town.

Similarly, artisanal miners working without the security of fixed term contracts generally have an acute appreciation of the temporality of urban mining places. In Ghana and Tanzania, miners who have managed to save money over time are likely to invest in building houses, generally in a nearby trading settlement or the regional capital, rather than the mining site, precisely because of their sense of urban mining place (Gough and Yankson, this volume; Bryceson and Jönsson 2010).

Artisanal mining settlements do not necessarily become ghost towns when the minerals are depleted. They are likely to survive as urban service centres if they are located on a main road, not constrained by water shortages and offer a service infrastructure that is superior to rural settlements in the surrounding area, particularly those close to new mineral rush sites. Having been substantial settlements in their mining heyday, they usually have considerable educational, health and other amenities. And as Kamete (this volume) documents, towns such as the abandoned corporate mining town of Mhangura, with its crumbling housing and service structure nonetheless became a haven for Zimbabwe's politically displaced foreign workers, some of whom took up tribute mining as a last resort.

Mining's impact on urban development, welfare and poverty

Mining creates stark economic variations in wealth and poverty, which has taken racial and sometimes ethnic patterns, as well as creating wealth disparities and tensions between rural agricultural and mining communities in various instances (for example, Bryceson *et al.* 2011). What is striking is that welfare in formal urban mining settlements has generally been an outcome of state and corporate mining policies. Trade unionism emerged among African mineworkers in South Africa, Ghana and Zambia in the 1940s, but the South African union was crushed after a national strike in 1946. The present National Union of Mineworkers was not established until the 1980s. Without trade unions to fight for their welfare, workers in large-scale mines had been left to the mercy of the government's and the mining corporations' attitudes towards workers' welfare.

The development of corporate social responsibility is based on mining companies' efforts to secure a 'social licence to operate' which entails utilizing environmental and social standards to predict and limit negative external impacts and curb in-migration (Shankleman 2011). While expunging the South African compound model and embracing what is now known as the Ghanaian open model of mineworkers residing in the adjoining towns, some of the big international companies have provided major infrastructural improvements, including water installations, phone masts, health dispensaries and improved roads for the benefit of town residents generally.¹⁴ Chinese mining investment often has gone further with the provision of major installations like pipelines, transport and shipping installations and sports stadiums, which tend to benefit Africa's capital cities and ports.

Gwebu (this volume) assesses the significance of diamond revenues for the welfare of Botswana as a whole. The population rapidly transformed from primarily rural cattle keepers to urban dwellers in multi-occupational settings within one generation. Special attention has been paid to the equitable regional division of the benefits. Welfare indicators rose accordingly with regard to access to the basic needs of food, water and housing, reflected in its middle-income status according to the World Bank's classification. Whilst it represents the exception to the rule in sub-Saharan Africa, the Botswanan case underlines the need for a strong development state with the institutional capacities to harness mining revenues for development.

The experience of the DRC, on the other hand, provides a starkly contrasting illustration of the resource curse thesis, with its massive mineral wealth matched only by its status as one of the least developed countries on earth. Against a history of plunder and conflict, Patience Kabamba (this volume) draws a distinction between processes of urbanisation in the relatively prosperous gold city of Butembo and the impoverished diamond city of Mbuji-Mayi. He argues that the cultural norms of Nande gold traders investing in Butembo housing and infrastructure encourage local embeddedness, whereas the Lunda diamond traders are socially fragmented and reliant on external patronage, fostering widespread insecurity and poverty in Mbuji Mayi and the Lunda region generally.

As Kamete (this volume) shows, the role of nation-states in mediating between global and local forces is not always positive, as illustrated by the Zimbabwean state's ruinous economic policies and political repression. People displaced from rural and urban areas by the government's land reform and "urban clean-up" campaigns in the 2000s settled in former mining towns, resulting in both demographic revival and desperate impoverishment. The fate of the Zimbabwean mining towns provides a unique mutation of the mining settlement cycle whereby decline is followed by a new 'growth' phase based on forced migration without any basis in capital accumulation.

Another important set of dynamics has been at work on the Zambian Copperbelt, where a system of welfare capitalism that had been established in the 1950s finally collapsed with preparations for privatisation in the late 1990s, resulting in high levels of poverty and the informalisation of livelihoods alongside subsistence agricultural production and some artisanal mining. Mususa (this volume) argues that the decline of mining has led to higher levels of poverty within some mining settlements, though there has been a partial recovery on the old Copperbelt in the last decade, as well as new mining developments in the North Western Province. Foreign investors, from Canada, India and elsewhere have injected large amounts of capital, but have not been prepared to revive the welfare systems, including schools and clinics.

The past is even more difficult to reconcile in terms of the loss of life and misery that conflict mineral production has inflicted on the African continent. Conflict mineral exploitation is categorically devoid of welfare benefits for those subject to its machinations. As Maconachie (this volume) documents, the rebel-affected diamond-producing areas of Sierra Leone contain some of the worst poverty in the country. Kono district is still undergoing a painful process of reconciliation with hopeful signs of reduced tension.

Finally, there is the issue of welfare for miners who seize the opportunity to improve their standard of living and invest for the future. Significantly, evidence from Tanzania, Angola and Ghana suggests that artisanal miners have a tendency to avoid building permanent houses on mineral rush sites, preferring to invest in modern housing in nearby trading centres or regional towns (Bryceson and Jönsson 2010). This tends to reflect artisanal miners' acute appreciation of the temporality of urban mining places. In this way, mining spurs an indirect and locationally deflected urbanisation.

Conclusion

Our introductory overview has been drawn with broad-brush strokes. Much of the interplay of mining and urbanisation is unrecorded, buried in the mists of pre-colonial history, then considered self-evident and not worth mentioning in colonial records and similarly overlooked in bureaucratic reports of post-colonial governments in which mining and urban ministries occupied different mindsets. Detailed case studies of the intersection of the two are now emerging as demonstrated by the national case studies in this volume and various recent publications written primarily by anthropologists based on first-hand accounts of artisanal and corporate mining.¹⁵ As the number of Sub-Saharan mining investments by small and large-scale mining interests proliferate over the coming decades, there is a need for more local studies and macro analyses of mineral production and trade figures in relation to urban population data.

While this review has identified a number of thematic threads that hint at recurring interactive patterns, there is no grand narrative or iron law whereby mining dictates specific urban outcomes. Instead, the connection appears to be a matter of historical contingency in the context of global mineral demand. Over the broad sweep of African trade history, gold has played a significant role, with its enduring intrinsic value and demand through the ages as a luxury commodity. Beginning in the late 19th century and expanding throughout the 20th century, diamonds gained in importance, alongside industrial minerals like copper, tin, zinc, uranium, platinum and coal and more recently highly valued rare earth minerals including columbite-tantalite (coltan).

Mineral exploitation through time has been moulded by prevailing technology and institutional arrangements. Insofar as Africa's ancient history is discernable, gold was a major luxury whose production and trade was associated with African kingdoms and chiefs. Already in the 13th century, there were African gold mining sites connected to Arabian, Asian and European markets, via East African Swahili coastal city-states. Elite, enclave cities for trade and large populous, but probably makeshift, production centres formed the urban mining landscape of that era.

From chiefs and city-states, the organisation of mineral production and trade gradually shifted over the centuries to the coordinated exercise of corporate and state power. In the late 19th and early 20th century, as European colonial rule engulfed the continent, a racial policy of perverse urbanisation based upon African rural-urban circular migration, mining compound residences and Bantustans was instituted in South Africa. Segregation and apartheid did not curb urbanisation as intended, but inflicted dislocation and damage on African family coherence and fostered pervasive racial discrimination in urban society.

The late 20th century witnessed widespread deagrarianisation of African economies and African governments' adoption of neo-liberal policies, which propelled rural Africans to search for remunerative forms of income (Bryceson 2000). Large numbers gravitated towards artisanal mining with the expectation of high earnings. This opportunity was also snatched by rebel armies seeking sources of finance, notably from diamonds, for waging civil war, which placed mining in the thick of recent African history. Over the past decade, surging world commodity prices and liberalised investment regimes have spurred a resurgence in international capital's investment in mining in Africa, but artisanal mining tends to involve far more people in urbanising processes than large-scale mining. Artisanal miners are also more mobile in moving between sites in response to mineral depletion.

At present, housing in mining settlements encompasses what is either provided to or afforded by large-scale mine workers, on one hand, and artisanal miners' generally informal and often makeshift housing, on the other. Welfare differences between the two cannot be encapsulated in a simple dichotomy between adequate and inadequate. Miners employed in large-scale mines may face employers' continued reluctance to provide for long-term family housing, while artisanal miners seemingly poor makeshift circumstances may be a pragmatic choice while they save their earnings to build a house elsewhere.

African mining and urbanisation narratives, from the outset of the eureka moment of mineral discovery, are about temporality and the need for 'digging deeper' or 'moving on'. Inevitably, this has a direct effect on the nature and spatial pattern of urban settlement. Eventually, either the mine production or mineral trading withers and dies, with its residents scattering elsewhere, or alternatively other *in situ* livelihood activities arising, or some combination of the two occurring. What makes the story of African mining and urbanisation so diverse in settlement trajectories and erratic in livelihood and welfare paths is how the temporal and spatial limitations of mineral availability intersect with miners' work and residential rights. Family welfare largely depends on miners receiving sufficient earnings and scope to establish their families' residence locationally alongside their mine work. This was not the case under apartheid and has various degrees of resolution at present in artisanal and large-scale mining, given prevailing political power structures and the inevitability of mineral depletion.

Finally, we return to our earlier concept of mineralising urbanisation. We have argued that many countries on the African continent are currently experiencing successive localised mining booms and busts catalysing profound local, regional and national effects on urban settlement. While artisanal and corporate mining impact on urban change in markedly different ways, the effects are nonetheless interwoven as revealed in the articles in this collection. There is a profusion of temporal uncertainties in relation to mineral discovery, access and depletion, fluctuating global mineral prices, changing corporate management ownership and policy shifts, and government intervention regarding mineral access. After the certainty and euphoria of mineral discovery comes the uncertainty of settlement trajectories with highly indeterminate outcomes. As African large-scale and artisanal mineral output accelerates, the ensuing complex changes in settlement patterns are integral to profound transformation of African national political economies and societies. The interaction of mining and urbanisation needs to be documented, understood and acted upon to ensure a more productive, just and tranquil future.

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Notes

- ¹ In pre-colonial history, urban areas were likely to consist of populations of between 5000 and 20,000, sometimes more. There are virtually no in situ records of population totals. A handful of foreign visitors wrote travel journals where they were apt to estimate the population of large, impressive settlements, but no one operated with notions of critical population levels.
- ² Freund (1981, 79) notes that the Nigerian Chamber of Mines requested a government organised labour bureau modelled after the Rhodesian Native Labour Bureau in 1911 with the intention of reducing the cost of wages. It met with rejection on the grounds that the government felt it would interfere with peasant export crop production.
- ³ It is estimated that Angola's rebel force UNITA was earning \$300-350 million per year (*Financial Times* 3 May, 1996 cited in De Boeck 1998, 782).
- ⁴ Note that the majority of internally displaced persons were 'ordinary' rural citizens caught up in the conflict, an estimated 500,000 farming families. Their entry into Freetown and return to home areas represented a massive population shift that exceeded that of ex-combatants.
- ⁵ China accounted for 29%, 66% and 25%, respectively, of the growth in demand for oil, copper and nickel in 2005 (UNCTAD 2007, 89).
- ⁶ For example, Le Billon and Levin (2009, 701) reports: 'Operation Brilhante (Shining) – facilitated the further industrialisation of the diamond sector and brought the ratio of artisanal to industrial production in value from a quarter to an eighth between 2002 and 2006. Angola has achieved the highest fiscal ratio among conflict-affected countries and one of the highest growth rates in tax receipts over the past five years. Yet cronyism is rampant in the mining industry and the KPCS [Kimberley Process Certification Scheme] itself is used as an excuse for criminalising artisanal miners'.
- ⁷ In the 2001 South African census the population totals were: Johannesburg, 3.2 million; Durban 3.1 million; Capetown 2.9 and Port Elizabeth, 1.0 million.
- ⁸ In addition to the metropolitan municipalities of Johannesburg, Tshwane and Ekurhuleni, there are two district municipalities divided into seven further local municipalities.
- ⁹ Kitwe, Ndola (now an administrative, commercial and mine service centre), Chingola, Mufulira, Luanshya.
- ¹⁰ The DRC has not had a census since the 1980s but 2004 estimates based on the United Nations MONUC-DPKO GIS Unit listing its principal cities that are in descending population are: Lubumbashi, 1.28 million (copper); Mbuji-Mayi 1.21 million (diamonds); Kananga 0.72 million (copper, cobalt); Kisangani, 0.68 million (diamonds); Bukavu, 0.47 million (gold and tin); Kolwezi, 0.46 million (copper); Likasi, 0.37 million (copper and cobalt) and Tshikapa, 0.37 million (diamonds).
- ¹¹ As of 2004, Kenema (population 128,402) and Koidu (population 82,899) are the third and fourth largest urban concentrations in Sierra Leone.
- ¹² Grätz (2009) describes similar circumstances in artisanal gold mining settlements of Northern Benin.
- ¹³ It should be noted however that the official language of the mines was Fanakalo, a mine pidgin (based on Zulu), compulsory underground for all black workers and white supervisors for safety reasons.

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- ¹⁴ Interview with Mining Officer Mr Joseph Mangilima at the Anglo-Gold Ashanti-owned Geita Gold Mine in Geita, Tanzania, 4 September 2011.
- ¹⁵ See Carstens 2001; De Boeck 2008; Duffy 2007; Luning 2006; Verhoeve 2004; Vlassenroot and Büscher 2009; Walsh 2003; 2012; Werthman 2009.