

The Democratic Republic of Congo: From stones in the river to diving for dollars

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Abstract

In this chapter we describe different gold mining crystallizations in Eastern DRC, tracing their shapes to historical/institutional and geographical/ecological environments. We see them not as path dependent outcomes of a shaken colonial and postcolonial history, but as crystals, emerging out of contingent arrangements of atoms, in the form of labor, capital, technology and land arrangements. Theoretically our chapter speaks to two main arguments of this book. First, it depicts informalization as an increasing reliance on cheap, flexible labor, and a state apparatus that takes a step back from its regulatory and distributional obligations. Second, the way in which ASGM and industrial gold mining evolve together and in response to one another, testifies of them being part of one global gold production system.

Keywords: Democratic Republic of Congo; colonial history; value; accumulation; war/violence

1. Eastern DRC: an opening

Gold mines, already left behind exhausted or currently producing, protrude the mountains and rivers of the Eastern DRC as profitable orifices embedded into the bedrock of the earth. Whether rock deposit or alluvial, their geological fixity ripened over time and makes them to a certain level immobile and stuck *in* time, compared to the large international flows, movements and connections that we normally consider in a global commodity chain (Bauman 1998). And yet many things have moved, switched, and turned vehemently around these orifices during the past century. In this chapter we follow traces of gold in the Eastern DRC. We first wander through some historical stages in Congo's political economy and their entanglements with different modes of gold production. Second, we uncover how those histories have given rise to a widely diverse and contingent assembly of gold mining crystallizations operating within in a larger global gold production system. We seek to explicitly address this diversity by displaying four gold mining crystallizations: Kamituga, Luhwindja, Mukungwe and Shabunda. These feed into our argument on informalization, connecting each place to the book's central arguments. We conclude with a reflection on Eastern DRC's position in the global gold production system. Our analysis is based on a wealth of qualitative data gathered during intermitted fieldwork periods of both authors between 2008 and 2019.

2. Traces of Gold: A Historyⁱ

Precolonial traces of an embryonic gold market were found in what is currently known as DRC's North Kivu province, where gold was used to make jewellery and royal attributes (Vwakyankazi 1992), and in Katanga, from where gold nuggets were sent to the sultan of Zanzibar during the 19th century Arab slave trade (Cline 1937). Yet for a long time, only copper and iron had any real exchange value. In Western Sudan, for example, the population was ready to exchange their gold for salt, brass, and iron (Cline 1937, Vilar 1977, Eliade 1978). And it was not until the late Middle Ages and the advent of the Portuguese gold trade, that the white metal assumed any importance, and that metallurgical myths started to embed the soft metal within auricultural tales that entangled a colonial presence with precolonial cosmologies (Blakely 2006). With the Belgians arriving in the late 19th century, the presence

of gold radically opened up central Africa to a global gold trade dominated by the Europeans. Consider this tale from what is now South Kivu's most important mining town, Kamituga:

“The Belgians started to talk to grandfather (early 20th century), telling him they were looking for stones in the river. It was about gold. Grandfather answered that he didn't know much about that. So he told them they could pick up as many stones as they wanted, as long as they left him the fish and the crabs. Because these crabs were feeding his family”.ⁱⁱ

From the late 19th century until about 1920, Belgian prospectors traversed the Eastern DRC in search of alluvial deposits. They used panning (in rivers) and skimming (from topsoil) techniques to identify easily accessible deposits (Bakonzi 1982: 115). In the 1920s, Belgian capitalists – some of whom had been granted immense territories by King Leopold II – started to invest in order to extract gold on a larger scale. Capital investments and new technologies, such as water pumps, compressors, drills and ventilators enabled these companies to start mining underground, to drain water in the deeper strata of the subsoil, and to generate high profits. Buelens and Marysse (2009) attribute these impressive profit rates, apart from the international hunger for minerals and the ample availability of Belgian capital, to the extremely low labour costs: Congolese mineworkers earned a meagre 2 to 4 percent of European wages. An initial reluctance of the autochthonous Mulega population to work as miners, for example, caused the Belgians to recruit workers from neighbouring countries and provinces. Meanwhile the Mulega were displaced from their traditional forest habitat and forced to cultivate on *paysannats* -- accumulated patches of farmland in the vicinity of the mining towns (Biebuyck 1973). Exploitation and coercion were rife, workers were not even allowed to move around freely, and tales of auriferous toxicity were spread to keep workers from taking or hiding gold. Pointing out the risks involved in the usage of cyanide was used as a rhetoric to prove gold's very own toxicity.

Stabilizing the workforce became a real concern, causing the exploitative system of labor control to make way for a more paternalistic model at the end of the 1930s. Congo's economy recovered and boomed during and after the Second World War. Yet its surge was halted when the decolonization movement provoked a massive flight of capital in 1958 (Buelens and Marysse 2009). Around the same time, company agents started to document “gold thefts” inside the concessions. These could be gold panners working in alluvial sites, or *creuseurs* (diggers) going underground in abandoned and often dangerous parts of the Belgian mines. In 1963, these thefts reportedly amounted to 30-40 percent of MGL's (*Minière des Grands Lacs*) production. But the *creuseurs* were protected through negotiations with police, magistrates and local authorities (Geenen 2015). They sold their gold to traders, who smuggled it to neighbouring Uganda, where prices were almost five times higher. The emerging clandestine gold trade network made clever use of decennia of knowledge accumulation and the availability of infrastructure and transnational trade routes. In this way, ASGM flourished alongside industrial gold mining throughout the 1960s and 1970s. In Kamituga for example, an estimated 60 percent of the population was involved in ASGM (Kasele and Kasongo 1979). This shift also demarcated a shift in the perspective of the value of gold in the mind of the Congolese population. Gold was no longer toxic, profit was to be made.ⁱⁱⁱ

Throughout the 1970s industrial production went in decline due to a lack of investments in exploration and production, degradation of mining equipment and loss of trained engineers, combined with President Mobutu's fatal nationalization policies (Bedidjo 2007). The fall of international copper prices in 1975 further plunged the Zairian state into an economic crisis. Seven years later the president opened up the gold frontier by liberalizing the exploitation and trade in gold and diamonds (1982), presenting it as an attempt to mitigate the effects of this deep economic crisis. Despite the moribund state of the Zairian transportation network, ASGM moved into increasingly remote territories and became connected to Ugandan and Burundian smuggling networks. Rising gold prices enabled these networks to generate huge profits, allowing them to enter into alliances with high-ranking politicians and military personnel (Geenen 2015).

In 1983, industrial gold production dropped by 39 percent and ASGM-production grew to four times the volume of industrial production (Tshibanza and Tshimanga, 1985: 339). In the same year, SOMINKI (*Société Minière et Industrielle du Kivu*), a gold and tin producer and successor to MGL, made an attempt to officially buy gold from ASGM, but as the price they offered was much lower than that in the black market, they did not succeed (Geenen, 2014: 112). They did, however, allow technically unemployed ex-workers –whom they had been forced to lay off– to dig in abandoned parts of the concession. At the same time clandestine diggers continued to enter into Sominki’s main underground mine, Mobale, and organized themselves in the *Nindja* movement. Their ways of entering in the shafts and getting the gold out became increasingly sophisticated and risky, and dependent on patron-client relations with traders operating above-ground as well as corrupt policemen and Sominki headmen (Geenen 2015).

In the 1990s, a combination of hyperinflation, political crisis and armed rebellion against the Mobutu regime led to the complete collapse of what was left of the mining industry. During two successive wars (1996-97 and 1998-2003), ASGM became an integral part of a regional war economy, which was dominated by unscrupulous gold traders, Ugandan and Rwandan troops and various domestic rebel groups relying on forced labour, violence and illegal taxation. For a growing number of displaced people, ASGM became the only viable income source (Vlassenroot 2004). For mining companies, it was nearly impossible to operate in such an environment. South African-based AngloGold Ashanti and Canadian junior Banro Corporation, which had signed contracts with both the old and the new regime, were forced to suspend their activities. After 2003 they were supported by the new Kabila regime, which prioritized investment in large-scale mining. While new investments boosted industrial gold production in the early 2010s (peaking at 31.8 tonnes in 2015, ITIE 2017), both Kibali Goldmines (a joint venture of Barrick, AngloGold Ashanti and *Société des Mines d’Or de Kilo-Moto^{iv}*) and Banro Corporation (now Cayman Islands-based and partly taken over by the Chinese Baiyin^v) faced a number of technological, infrastructural, financial and socio-political challenges (including resistance by local communities and ASGM operators) that eventually forced them to close three out of four mining concessions (Geenen and Verweijen 2016).

Around 2010, a combination of increased regulatory pressures on coltan and tin (related to international concerns about conflict minerals and a national ban on all ASM activities, Geenen 2012), depleting reserves in some of the big coltan and tin mines, and rising gold prices, provoked a massive shift of workers into ASGM. In some of the larger sites such as Misisi, Kamituga and Shabunda, investment in technological innovation (ball mills and dredges) is driving up production, yet at the same time continuing insecurity – as a result of armed group presence such as in Misisi, Namoya and Shabunda, or corporate presence such as in Kamituga – is hampering this. ASGM, which is entirely informal, is now estimated to employ almost 200,000 miners in the Eastern DRC alone, with an annual production of an estimated 11.6 tonnes per year (IPIS 2016). Extraction happens in different ways: underground mining in mountains, alluvial mining in river beds using panning and sluicing techniques or using dredges, recovery of gold from colluvial or eluvial deposits using hydraulic motors, or recovery of gold from waste soil. After processing, the gold is sold to local traders – most of whom are operating informally as well – who either sell to intermediate or master traders, or work as commissioners for the latter. Master traders, based in the region’s larger towns, smuggle most of the gold to Burundi or Uganda, following decade-old trade routes, or directly to Dubai. Official gold exports from the DRC have rarely exceeded 100 kg per year in the past decade (Geenen 2015).

In what follows we describe four different gold mining crystallizations, with a focus on labour organization and revenue-sharing arrangements. We trace different shapes in these crystallizations to historical/institutional and geographical/ecological environments, seeing them not as path dependent outcomes, but as crystals, emerging out of contingent arrangements of atoms. The description is not exhaustive, nor do we aim to fix particular crystallizations in particular places; they merely serve as

illustrations of the wide variety of crystal shapes that can be formed in the interaction between humans, tools, mountains and rivers, and what lies beneath.

3. Gold Mining Crystallizations: Four Snapshots

1.

In Kamituga the legacy of six decades of industrial mining (1930s-1990s) and six decades of artisanal mining (1960s-2010s) has left scars in the landscape and on the people. It has carved out a labyrinth of underground tunnels piercing the surrounding hills, torn and diverted entire rivers from their beds, moved heaps of mud from one place to another, washed away the top layer of some gold-rich soils, and made shacks grow like mushrooms in between and around abandoned colonial buildings. The number of inhabitants has grown exponentially, from 33.000 in 1992 and 56.000 in 1999 to almost 200.000 nowadays (Geenen 2015). The number of artisanal miners is estimated at 15.000 (estimates from 2015; Stoop et al 2016: 19). In this snapshot we focus on underground mining.

Mining of primary gold veins started in Mobale – Kamituga’s main underground mine – in 1937, when the cyanide flotation plant was commissioned. Horizontal main tunnels were dug just beneath the gold vein, and miners attained the auriferous rocks through smaller tunnels of about 1 m in diameter reaching up to it. Stones were excavated over a length of about 75 cm, after which they left a pillar to support the ceiling. The excavated stones were then loaded onto little wagons, and a mechanised rail system carried the loads to the processing plant. As mentioned above the first artisanal miners either worked in alluvial sites (panning), or entered illegally in underground Mobale. Since the 1980s they also started to open up new tunnels, reaching hundreds of meters far, wherever they suspected gold veins in near-surface deposits.

In the beginning of an underground mining project there are few people involved, but depending on how the work proceeds, teams may grow up to 10, 20, 50 and even more than 100 miners, all of whom have specific tasks: *PDGs* (shaft managers) act as owners/financiers who cover all expenses until the pit starts producing; *bouts de feu* are specialized workers using explosives to open up tunnels; *foreurs* (drillers) are young and able-bodied men proceeding in the tunnels by using hammers and chisels; *peleteurs* (shovelers) clear the rocks or sand and evacuate the 25-30 kg bags to the tunnel entrance; *boiseurs* shore up the tunnels with wooden trunks in order to prevent cave-ins; *conducteurs* have the technical experience to coordinate the work underground; and *capitas* supervise one team or one shift and are in charge of daily management.

Specialized workers like *bouts de feu* and *boiseurs* are paid per task. They are not necessarily attached to one specific shaft, but can be very mobile and work in different projects. Other workers are not paid in cash, but in a quantity of rocks or sand - or more precisely a number of bags containing rocks or sand. Generally, one-third of the extracted ore is used to reimburse the investment costs, including all kinds of taxes and contributions, one-third goes to the shaft manager, and one-third is distributed among the other workers. As remuneration comes in kind, it is common practice to evacuate one metre of rocks or sand to cover the costs (one layer or *muzamio*), one metre for the shaft manager and one metre for the workers. Individual workers take their bags to the *loutra* (processing place). They pay *mamans twangaises* (female crushers) to pound the rocks and do the washing and cleaning themselves, before selling their gold to local traders. This system of revenue sharing means that profits are unpredictable and depend on the ore concentration as well as losses incurred during processing. The unpredictability of earnings is an important factor in explaining the specific desire and hope

inflamed by gold mining, which is reflected in pit names such as *Qui cherche, trouve*/Those who seek, shall find, *Kitumainiya kesho*/Tomorrow's hope^{vi}, or *Bana Espoir*/They have hope^{vii} (Geenen 2018).

In recent years declining gold contents and increasingly difficult accessibility have pushed people towards adopting new techniques. Most importantly, in 2011 a trader imported the first three ball mills from Tanzania. One year later, 70 ball mills were already operational (Mulonda et al, 2019). Productivity increased: where a *maman twangaise* was able to pound 25 kg per day, a ball mill treats 300 kg in half an hour. This allows miners to more efficiently process lower-grade ore (*mamans bizalu* who buy waste products from the loutra have seen their recovery rate multiply), and allows for the (re)opening of sites that were previously unproductive. The price has gone down from 60 USD (manual labour) to 6,25 USD (mechanized) today.

2.

With its wooden shacks stacked against the muddy hillsides, its lack of sanitary and other public facilities, and its abundance of bars and prostitutes, Mukungwe could be the 21st century version of a Californian gold rush town. Approximately 200 gold mining shafts are dispersed over two main hills: Kalanga and Lukwera/Kalazi. Along the Nyantanda river alluvial gold mining is taking place. Anno 2012 annual production was estimated to be between 50 and 70 kg of gold, with an estimated 1000 to 3000 artisanal miners working underground and in rivers^{viii}.

Since gold was discovered – according to the legend by a grazing cow - in the 1970s, two families have been disputing the land, trying to secure access to the wealth in the underground (Geenen and Claessens 2016). They have done so by using violence and coercion, and by demanding high contributions from the miners – varying between 30 and 50 percent^{ix}. Life in Mukungwe is precarious and unpredictable, power has switched hands multiple times, and the people who mine here are typically young, male and migrants who do not stay for a very long time. This institutional environment shapes the particular mining crystallizations that have emerged in Mukungwe, and more particularly the system of revenue sharing.

In Mukungwe's underground operations, bags filled with ore and sand are distributed between the team and the land owners (depending which family is in charge at a particular point in time), whereby one third to half of the production goes to the land owner; of what remains half goes to the shaft manager and half to the workers. But contrary to what happens in Kamituga workers in Mukungwe do not process their production themselves. Instead they immediately sell the sand (*makaru*) to small traders hanging around in the sites. These traders pay the miners according to the expected quantity of gold concentrate contained in the bags. This may be a rather rough estimation, although the traders say they base themselves on samples and traces of a particular colour in the sand, which they call *jogge*. Their price is based on estimations, taking into account costs they will need to make for processing the sand and a profit margin^x. According to observers, traders tend to benefit in these transactions because they underestimate the yield^{xi}. One interviewee even recalled an experience in which he had sold sand to a trader who profited so much that afterwards "he was able to buy a house in the most expensive street in Bukavu (the provincial capital)"^{xii}. Some miners also took credit from these traders and the latter demand to be paid back in a quantity of sand. Yet it does seem to be a big gamble for the miners, which can be explained by the fact that they want a quick turnover^{xiii}. They desire to "pocket the money immediately"^{xiv} and are in a constant need for cash to cover their "immediate needs"^{xv}. It is the uncertainty, violence and precarity of life in Mukungwe that shapes revenue sharing and labour arrangements, but also human interaction in general.

3.

Luhwindja's mining crystallizations are the products of a history of disputed and negotiated access, involving local Bashi populations and migrants, customary authorities and rivaling elites, companies and military (Geenen and Claessens 2013; Geenen 2015). Between 1957 and 1975 MGL explored for alluvial gold deposits in Luhwindja's Mwana river and followed the gold upstream to Mbweqa hill, but never started commercial production^{xvi}. During this period company agents worked alongside artisanal miners who first panned for gold in the river, and later opened up underground pits on Mbweqa hill. As early as August 1960 official reports were being made about these miners. Although they were technically illegal, they were condoned and even guiding the company's exploration efforts^{xvii}. Access to artisanal mining was firmly controlled by the chief or *mwami*, who plays a central role as allocator and safeguard of the land in Bushi communities. Miners had to ask permission from the chief and paid a monthly tax called *citore* (value of about 1 gramme of gold), next to other possible ad hoc contributions – amounting to an estimated 10% of total production (Dupriez, 1987: 105). MGL's successor Sominki never had a more than façade presence. And although Canada-based Banro Corporation acquired the mining titles in 1996, their actual presence on the ground was also prohibited by the two successive Congo wars.

In 2005, two years after the official end of the war, the Kabila government launched a military operation to chase remaining rebel units and effectively install Banro. Banro started exploration in Mbweqa and in the river Mwana basin, where a lot of gold concentrate had been carried as a residue from the artisanal washings in Mbweqa^{xviii}. Years of artisanal activity upstream had significantly increased the gold grade of the alluvial material. And since artisanal mining techniques do not allow to retrieve all the gold, Banro itself estimated that at least half of the 300.000 ounces of gold that had been wasted and washed away from Mbweqa had not been recovered by artisanal miners^{xix}. In 2010 the *mwamikazi* (female chief), who had been negotiating about the relocation of some 6000 to 8000 artisanal miners and a couple of hundred households, ordered the closure of Mbweqa. But artisanal miners continued to work in Mwana, particularly in the three kilometer stretch downstream from Mbweqa. At the time of our visit in 2011 about 900 miners were slowing down the water and digging artificial channels, trenches and dykes. They were complaining about the greatly reduced flow rate, caused by Banro's upstream activities^{xx}.

Alluvial miners make use of a variety of instruments and techniques: they run the water with sediments through sluices or praus (*pirogues*), over the bark of a banana tree (*biporo*) or carpet (*blanchettes*), or they use a *kisasi* or a riddle which separates the largest stones before the water is ran through the sluice. The concentrate that remains in the sluice is amalgamated with mercury, mixing a pulp containing 80% of water and 20% of concentrates with 60-90 grams of mercury in a 20 liter bucket for 10 to 15 minutes (Nkuba et al 2019). Afterwards, water and tailings are slowly transferred into a second bucket for further amalgamation, while mercury and gold amalgam remain on the bottom of the bucket because of their higher density. The excess mercury is removed by filtration using a piece of cloth and is recovered and re-used for future amalgamations.

Mining teams in alluvial mining are smaller than in underground mining (3 to 6 members on average) and generally consist of family members or friends. Investment costs are low. Still there are a number of fixed costs, including payments made to the customary chiefs. In Mwana these amounted to 50 USD per week in 2011. They are collected by the miners' committee that also supervises the allocation of plots in the river and intervenes in case of conflict^{xxi}. All members of the team take an equal share in the production.

Meanwhile, Banro through its subsidiary Twangiza Mining was mining gold on an industrial scale, producing between 2500 and 4200 kg of gold in the 2013-2016 period (Radley 2019: 123). In doing so

they relied on 10 to 20 subcontractors – their number depending on the phase the project was in, their scope ranging from labor hire over construction and road maintenance to security and catering. During mine construction in early 2011, 2596 workers were hired through subcontractors, against 142 by Twangiza Mining directly (Geenen 2015). This number, however, rapidly declined during commercial production, when most unskilled, manual laborers were laid off. In 2013, 323 out of a total of 1149 workers worked for labor hire organisations (Radley 2019). Average wages paid by these labor hire organizations turn around 120 USD per month, while contracts are temporary and social as well as physical protection often limited (Geenen 2019). Although some of these workers had been recruited among the more than 6000 artisanal miners that had been displaced, most were not, and employment in industrial mining turned out to be a practically unavailable, and probably unviable, alternative for artisanal miners. Meanwhile, local elites – and particularly customary chiefs – managed to reposition themselves as owners of the subcontracting companies, ensuring a continued access to the mining rents (Geenen and Cuvelier 2019).

4.

Shabunda is not only the vastest and most isolated territory in South Kivu, it is also producing most gold. Before the arrival of ASGM, Belgian mining companies like Cimétain and Cobelmin –and subsequently Sominki (1976-1996)-- already dug for tin in the region. Gold however became a source of interest after these companies had left. Currently, a large chunk of it is extracted through approximately 175 dredges operating in the Ulindi river, and transported through one of the nine small grass landing strips that connect Shabunda's gold traders to Bukavu. Previously, alluvial extraction would involve diving in the river without any form of respiratory aid and divers (*plongeurs*) would rely on one single breath of air (locally called *kimbokoto*).^{xxii} Nowadays, the population and its rivers have gotten used to the view of fully automated bucket chain dredges, or *dragues robot/dragues à godets*, and artisanally assembled *bricolage* dredges that rely on divers.

Dredges arrived relatively late in Eastern DRC, around 2009. Contrary to the ball mills, which came from the East (Tanzania), dredges were imported from the West - from Angola via Kisangani. Along with them came dredge owners, operators and other workers from Oriental Province, Bas Congo, Kasai and Bandundu, and even as far as Gabon and Central African Republic.^{xxiii} A *bricolage* dredge, the most common sight in Ulindi river, is assembled on the spot with tools provening from different parts of Sub-Saharan Africa. The assembly is quite straight forward. Connect empty drums to one another and cover them with planks to create a floating device. Next, attach a hoze to an oxygen pump and set up a pump with a metal ending (*bec*) that realizes the suction of gravel (30 meter). Strap an anchor (*oringuer*), a Janfan outboard motor, and dead-locks (*fechadura*) to the raft. Finally, set up a sluice covered by a carpet on which the auriferous gravel will remain stuck. Gravity is key. Some of the lusophone names (i.e. *fechadura*, *mangeira*) betray an Angolese origin. However, nowadays, most parts are transported from Uganda or South-Africa. At first pumps of 4 inch (*pouce*) were used, yet current dredges reach up to 8. A normal artisanal dredge is estimated to cost USD 25.000, yet high transportation costs can drive the price up to 50.000. All of these costs, plus operational costs such as diving suits, food, gasoline and *mazout* are covered by the dredge owner.^{xxiv}

An average *bricolage* dredge is operated 24/7 by 25 to 35 people, working in shifts of about 10 people -- provided the dredge doesn't break down. Within this crew, a few divers (3), who take most of the risks by literally plunging into the opaque depths of the river, use nothing but tactile experiences and wit to discern between rock and sand, and generally take turns working 2-3 hours in a row. Taking breaks in between their shifts, they work up to three shifts a day each. After having learned the appropriate breathing techniques, divers use a pump to transport auriferous sand and gravel to the carpeted sluice. Other workers take shifts on a daily basis. There is a generic term for those working

on the dredge. They are called *motistes*. This part of the offshore crew mainly includes a mechanic, and a few machinists who supervise the oxygen supply and suction pumps. One or two cooks (locally called *S4*) and the workers who wash and treat the gravel with mercury (on average 2 kilogrammes per dredge per week) after the carpet has been loosened and transported to the river bank (*bacaneur*) stay at shore. If the owner is absent, a technical director is put in charge to supervise the operational procedure, making sure the whole operation works as planned. After a month's work, a dredge can reach up to 3 meters in the underlying bedrock. On average, however, a bricolage dredge digs between 0,5-3 meter in the subsoil (Cosoc GL 2015).

The mortal risk taken by the divers and the technicality involved in their profession (taking up to 6 months of training) is reflected in their payment. A diver is bequeathed 20% of the actually produced gold, 10% is divided among the onboard *motistes*, 5% is saved for the technical director, and a final 5% is guarded for the people who wash the sand and treat it with mercury (amalgamation). The owner takes 60%, yet 25% of his share is used to pay SAESSCAM (*Service d'Assistance et d'Encadrement du Small-Scale Mining*), the government's technical service that is theoretically in charge of assisting ASGM, but is in practice operating as a mere tax-extracting body. The 175 operational dredges reach a capacity of between 20-30 tons of gravel for every rotation of 2 hours, thus producing between 25 to 40 grammes of gold after amalgamation. However, technical impediments and defects can cause a lesser production, making numbers vary greatly. Often, the actual output lies somewhere between 3 to over 60 grammes per rotation. For this reason, the average production per dredge is estimated at 150 grammes of gold per day, with deviations up to 250 grammes (Cosoc GL 2015).

For a brief period in 2014-2016, a Chinese company (Kun Hou) was operating four fully automated bucket chain dredges in a part of the Ulindi river controlled by the rebel group Raia Mutomboki – a movement that originated in Shabunda as a reaction against the atrocities committed by the FDLR (*Forces Démocratiques pour la Libération du Rwanda*) and that was taxing up to 50 dredges at the time. Kun Hou's dredges had a length of 25 meter, reach down to 15 meter deep, and a processing capacity of 135 m³ per hour. Implicating both local authorities of the Bakisi chefferie and being accused of having bribed rebel groups, Kun Hou was finally chased away by the local population after a lethal incident had led irresolvable tensions to boil over in 2016. Now a common sight in Shabunda street life is to see earlier Chinese industrial dredges to be disassembled and recuperated to assemble artisanal *bricolage* ones.

4. Informalization: an argument

From a historical vantage point, the expansion of ASGM alongside a declining industrial production, as well as the replacement of a colonial industrial model by a more flexible subcontractor model, can be explained by the process of informalization (see chapter 4, this volume). Some of the dynamics that have been described can be articulated with reference to what Barbara Harriss-White wrote in her 2006 article on poverty and capitalism. Briefly put, the perpetual creation and recreation of poverty persists under capitalism because those owning the means of production constantly seek to squeeze costs and invest in new technologies in order to guarantee continuous accumulation. For such accumulation to take place, an initial process of capital concentration is needed: traditional modes of production are to be destroyed and labor is to be dispossessed of its productive assets, forcing it to become wage labor – this is roughly what Marx would call alienation. Within this process the state plays a primordial role. Not only does it create the “the institutional preconditions for capitalism” by protecting private property rights and ensuring public goods, but it also does so, as shown by Mobutu's liberalization policies, through the encouragement and incorporation of ‘petty production’ (idem: 1242)– although the recent scale increase via new technologies could easily start to contest the nature of this pettiness.

As for now, ASGM in eastern DRC remains a very specific form of petty production, not very different from what Ana Tsing recently described in her work on the Matsutake Mushroom. As is the case for mushroom pickers in “Open-Ticket Oregon”, the crystallizations arising between wealth-seeking/or poverty-escaping diggers and traders give us a peculiar insight into what a kind of pure capitalism would look like. And yet strangely so, as is affirmed by Tsing, capital does not cling to these sites themselves. What is gained is quickly spent on private spoils. The actual accumulation of capital that enables investment is located elsewhere, far beyond the aspiration of wealth that haunts Congolese diggers’ dreams. In practical terms, the lack of big capital and the uncertainty that is tied to short-term investments and flexible labor impede any quest for accumulation of capital in the informal sector. In this perspective, the informal economy can be defined as a form of production that inherently restricts local accumulation in time and space. Time and again, profit is squeezed out and slips through the net. This argument is confirmed in Mulonda et al’s (2019) analysis of the recent introduction of ball mills in Kamituga’s artisanal gold production process. While theoretically this new technology opens up possibilities for capital accumulation and more local investments –and does so where the state cannot reach--, the Congolese government and the multinational mining company have chosen to respond with repression. Moreover, wherever wealth is accumulated, politically well-connected elites and businessmen tend to reap the benefits, keeping the mineworkers in a state of uncertainty and precarity. In line with Harriss-White (2006) and authors such as Phillips (2011) this can be seen as the logical effect of top-down policies that seek to keep costs down and deflect responsibilities towards labor. Rather than disappearing under the weight of global capitalist production, small-scale and informal gold mining crystallizations actually proliferate.

5. Eastern DRC in the global gold production system: a conclusion

The attempt to turn Eastern DRC into an extractive geographical zone was imagined by the Belgian colonizers as a *scalable* project. In order to systematically control and exploit it, the region was first divided into administrative structures and substructures such as provinces, regions, territories, and chiefdoms. A necessary presupposition in this wider project is to appropriate the domestic and migrant populations as exploitable labour forces, the subsoil as a tradeable source of revenue, and the topsoil as arable farmland. It is a classic, repetitive tale of *salvage* accumulation of which the larger colonial history is rife (Tsing 2016). Yet during the period of post-colonial economic decline and further stimulated by Mobutu’s liberalization policies, accumulation took a different turn. Producing and selling gold no longer required a meticulous control of the population working as employees in the pits, in the labs, on the farms, or in the administration. Instead, miners turned *creuseurs* which could fend for themselves. The slogan *Débrouillez-vous* even made it – jokingly yet painfully serious – into a fictitious Article 15 in the Constitution. One of the things the rise of ASGM in the second half of the 20th century shows clearly, is that it had become a possibility to reap the profits of an extractive value chain without any real governmental commitment to regulate mining, protect labor, or redistribute mining rents. Development, in other words, had become obsolete, even more so during two successive wars.

Against this abject history, locally specific and contingent arrangements around land, labor, capital and technology started to crystallize into different yet very recognizable gold mining crystallizations. Revenue-sharing arrangements, for example, differ across the four cases presented in this chapter. Their shape depends on capital (the higher the investment made, the higher the returns for the financier), labor (specialized labor paid per task, skilled or risky labor taking higher shares), technology (availability of technology such as mercury amalgamation or ball mills) and land (traditional and customary land arrangements translating into taxes and contributions). In turn, the availability of capital, technology, labor and land, simultaneously depends on the institutional and ecological environment (as depicted in figure 1 in chapter 2).

Eastern DRC's history of industrial gold mining and ASGM bespeaks the way apparent contingent arrangements remain embedded in one system. Since the region has been opened up to the global gold trade, *creuseurs* and (foreign) companies are in constant renegotiation about their access to the gold, with local elites playing an important role as in-betweens, rent-seekers and labour controllers (Geenen and Cuvelier 2019). Depending on the political, economic and social context, as well as on the accessibility of gold deposits and the availability of technology and knowledge, ASGM is alternately condoned, ignored and combatted. Thousands of *creuseurs* can be chased from their sites by a powerful political coalition of foreign mining companies, national government and local gatekeepers; but they can fight back by reoccupying their former sites (as happened in Kadumwa and Mwana in Luhwindja in 2011) or by allying with rebel groups making skillful use of an anti-foreign occupation discourse to legitimize the claims of the *creuseurs* (as has happened in Namoya since 2017) (Geenen and Verweijen 2017). Yet often such cracks of possibilities seem to be short lived and precarious (Bryceson and Geenen 2016), even more so in view of the inevitably ephemeral nature of mineral deposits. Despite the frontier movement's characteristics of geographical expansion and technological innovation, the materiality of gold and its geological conditions make gold mining an uncertain and eventually exhaustible activity.

References

Bakonzi, A. (1982). *The Gold Mines of Kilo-Moto in Northeastern Zaire: 1905-1960*. PhD Dissertation. Madison: University of Wisconsin-Madison.

Bauman, S. (1998). *Globalization. The Human Consequences*. New York: Columbia UP.

Bedidjo, L. (2007). *Situation Preoccupante a l'Office des Mines d'Or de Kilo-Moto*. Bunia : Centrale Congolaise Du Travail.

Biebuyck, D. (1973). *Lega culture. Art, initiation, and moral philosophy among a Central African people*, Berkeley: University of California Press.

Blakely, S. (2006). *Myth, ritual and metallurgy in ancient Greece and recent Africa*. Cambridge: Cambridge University Press.

Bryceson, D. and Geenen, S. (2016). Artisanal frontier mining of gold in Africa: labour transformation in Tanzania and the Democratic Republic of Congo. *African Affairs*, 115 (459), 296-317.

Buelens, F. and Marysse, S. (2009). Returns on investments during the colonial era: the case of the Belgian Congo. *The Economic History Review*, 62(1), 135-166.

Cline, W. B. (1937). *Mining and metallurgy in Negro Africa*. George Banta Publishing Company.

Cosoc GL (2015). *Gold Rush in Shabunda: Practices and Impacts of Dredging*. Bukavu, Cosoc GL.

Eliade, M. (1978). *The forge and the crucible: the origins and structure of alchemy*. University of Chicago Press.

Geenen, S. (2012). A dangerous bet. The challenges of formalizing artisanal mining in the Democratic Republic of Congo. *Resources Policy*, 37 (3), 322-330.

Geenen, S. and Claessens K. (2013). Disputed access to the gold mines in Luhwindja, eastern DR Congo. *Journal of Modern African Studies*, 51 (1), 85-108.

Geenen, S. (2015). *African artisanal mining from the inside out. Access, norms and power in Congo's gold sector*. Abingdon: Routledge.

Geenen, S. and Claessens, K. (2016). Different faces of access control in a Congolese gold mine. *Third World Thematics*, 1(2), 249-266.

Geenen, S. and Verweijen, J. (2017). Explaining fragmented and fluid mobilization in gold mining concessions in eastern Democratic Republic of the Congo. *The Extractive Industries and Society*, 4(4), 758-765.

Geenen, S. (2018). Underground dreams. Uncertainty, risk and anticipation in the gold production network. *Geoforum*, 91, 30-38.

Geenen, S. and Cuvelier, J. (2019). Local elites' extraversion and repositioning: Continuities and changes in Congo's mineral production networks. *The Extractive Industries and Society. An international journal*, 6 (2), 390-398.

Geenen, Sara (2019). Gold and godfathers: local content, politics, and capitalism in extractive industries. *World Development*, 123, <https://doi.org/10.1016/j.worlddev.2019.06.028>

Harriss-White, B. (2006). Poverty and Capitalism. *Economic and Political Weekly*, 41(13), 1241-1246.

Kasele, L. and Kasongo, K. (1979). *La fraude de l'or et son impact sur le développement. Cas de Kamituga dans la zone de Mwenga, Bukavu*.

Mulonda, S.B. ; Radley, B. and Geenen, S. (2019). Arrêtez les concasseurs ! Transformation, quasi-dépossession et répression autour de la production d'or à Kamituga. In Geenen, S. ; Nyenyezi, A. et Ansoms, A. *Conjonctures de l'Afrique centrale 2019*. Cahiers africains 93. Paris, L'Harmattan, 158-186.

Nkuba, B.; Bervoets, L. and Geenen, S. (2019). Invisible and ignored? Local perspectives on mercury in Congolese gold mining. *Journal of Cleaner Production*, 221, 796-804.

Phillips, N. (2011). Informality, global production networks and the dynamics of 'adverse incorporation'. *Global Networks*, 11(3), 380-397.

Radley, B. (2019). *Mining industrialisation in the African periphery: disruption and dependency in South Kivu, DRC*. PhD dissertation. The Hague: Institute of Social Studies.

Stoop, N., Kilosho Buraye, J. and Verpoorten, M. (2016). *Relocation, reorientation, or confrontation? Insights from a representative survey among artisanal miners in Kamituga, South-Kivu*. IOB Working Paper 2016.09. Antwerp : University of Antwerp.

Tshibanza, M. and Tshimanga, M. (1985). Matières précieuses et libéralization. Esquisse d'un bilan provisoire. *Zaire- Afrique*, 196, 337-340.

Tsing, A. (2016). *The Mushroom at the End of the World*. Princeton: Princeton UP.

Verbrugge, B. and Geenen, S. (2019). The gold commodity frontier: A fresh perspective on change and diversity in the global gold mining economy. *The Extractive Industries and Society. An international journal*, 6 (2), 413-423.

Vilar, P. (1977). *A History of Gold and Money, 1450-1920*. Berkeley: The University of California Press.

Vwakyanakazi, M. (1992). Creuseurs d'or et crise socio-économique au Nord-Kivu en République du Zaïre. *Africa: Rivista di interessi africani*, 47(3), 375-391.

Vlassenroot, K. (2004). Reading the Congolese crisis. In: Vlassenroot, K. and Raeymaekers, T. (eds.) *Conflict and social transformation in Eastern DR Congo*. Gent: Academia Press, 39-60.

ⁱ Parts of this historical overview have been published before in Verbrugge and Geenen 2019 and Geenen and Cuvelier 2019.

ⁱⁱ Interview with the grandchild of an earlier Mwami, Kamituga, 20/10/2018.

ⁱⁱⁱ Interview with chef du personnel de Sominki, Kamituga, 25/05/2019.

^{iv} <https://www.barrick.com/English/operations/kibali/default.aspx>

^v <https://banro.com/about-us/>

^{vi} Fieldnotes, Mukungwe, 31/05/2012.

^{vii} Fieldnotes, Kamituga, 09/04/2008.

^{viii} Communication by cooperative leader, Bukavu, 29/02/2012.

^{ix} Group interview with miners, Mukungwe, 01/06/2012; interview with shaft manager, Mukungwe, 02/06/2012; interview with cooperative leader, Bukavu, 14/05/2012; Interview with shaft manager, Mukungwe, 31/05/2012.

^x Interview with trader, Mukungwe, 01/06/2012.

^{xi} Interview with shaft manager, Mukungwe, 31/05/2012; interview with local leaders, Mukungwe, 31/05/2012.

^{xii} Interview with local leaders, Mukungwe, 31/05/2012.

^{xiii} Interview with miner, Mukungwe, 01/06/2012; interview with local leaders, Mukungwe, 31/05/2012.

^{xiv} Group interview with miners, Mukungwe, 01/06/2012.

^{xv} Interview with shaft manager, Mukungwe, 31/05/2012.

^{xvi} Banro Corporation (2006) *NI 43-101 Technical report, Twangiza project, South Kivu province, Democratic Republic of Congo and MGL archives*

^{xvii} Letter to Mr. Goffinet, 20/08/1960, MGL archives, Royal Museum for Central Africa, Tervuren.

^{xviii} Banro Corporation (2007) *Alluvial gold potential of the Mwana river: preliminary evaluation*.

^{xix} Banro Corporation (2007) *Alluvial gold potential of the Mwana river: preliminary evaluation*.

^{xx} Interview with miners, Mwana, 26/10/2011.

^{xxi} Interview with miners, Mwana, 26/10/2011.

^{xxii} Interview with dredging engineer from Bas Congo, Shabunda, 14/11/2018.

^{xxiii} Interview with an academic, Shabunda, 13/11/2018.

^{xxiv} Confirmed by divers from Walekale, Shabunda, Durba, and engineers from Shabunda.