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Brazilian illegal gold miners resilience in French Guiana: The *garimpo* as an economic and social system

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Abstract

Artisanal small-scale gold mining, or *garimpo* in Portuguese, started in French Guiana in the 1990s. The French authorities have repressed it, but this has not led to the end of the activity. Based on extensive fieldwork, this paper aims to analyze the *garimpo* as an economic and social informal world built to be resilient to repression and to neutralize the high risks of clandestine exploitation. This *system* provides economic, social, and moral resources, all embodied in the *garimpeiro* identity, allowing a workforce made of thousands of individuals to act as a cohesive work organization. *Keywords*: informal mining, artisanal small-scale mining, clandestinity, marginality, environment.

Resumen: Resiliencia de los mineros de oro ilegales brasileños en la Guayana Francesa: El *garimpo* como sistema económico y social

La minería de oro artesanal a pequeña escala, o *garimpo* en portugués, comenzó en la Guayana Francesa en la década de 1990. Las autoridades francesas lo han reprimido, pero no ha supuesto el fin de la actividad. Basado en un extenso trabajo de campo, este artículo tiene como objetivo analizar al *garimpo* como un mundo económico y social informal construido para ser resistente a la represión y neutralizar los altos riesgos de la explotación clandestina. Este *sistema* proporciona recursos económicos, sociales y morales, todos encarnados en la identidad *garimpeiro*, permitiendo que una fuerza de trabajo compuesta por miles de individuos actúe como una organización de trabajo cohesiva. *Palabras clave*: minería informal, minería artesanal a pequeña escala, clandestinidad, marginalidad, medio ambiente.

Introduction

Artisanal small-scale mining provides a livelihood to about 20 million people worldwide. It produces at least 25 percent of the overall annual gold production (IGF, 2017), representing another type of extractive frontier, different from the big mining firms and the capitalist extractive frontiers present in many countries in South America. In Brazil, small-scale mining of gold or diamond is called *garimpo*, and it has a long tradition. After a boom in the Brazilian Ama-

zon in the 1980s, it spread to the nearby Guianas, more or less clandestinely depending on the country. In French Guiana, authorities started staging vigorous actions to uproot it from 2000 on. But even under pressure, the *garimpeiros* are still present and active today, showing impressive resilience. This paper aims at explaining the factors of this resilience which, in my opinion, stems from the fact that the *garimpo* is not just an extractive activity but a complete economic, social and cultural system. For materials, resilience is a quality that makes them return to their original state after deformation. However, when applied to ecosystems or societies, this concept has to be adapted because if societies persist despite disruptions, they do not end up the same as before (de Bruijn et al., 2017). In this case, resilience is not equivalent to stability (Holling, 1973), but it implies “coping, adapting and transforming capacities” (Keck & Sakdapolrak, 2013), which are what the *garimpeiro* system provides.

Based on extensive fieldwork in French Guiana for the past four years, this paper presents a quick overview of artisanal gold mining in the Amazon and in French Guiana, the methodology employed in the study, and how it relates to other works in the literature. In the second part, I draw a panorama of how the *garimpo* works in French Guiana. I then describe the main features of the economic facet of the *garimpo* system, insisting on its adequation with the hazardous nature of clandestine mining. In the fourth part, I review the social side of the *garimpo*, insisting on the role of the *garimpeiro* identity as a device giving coherence to an otherwise individualized world. In conclusion, I stress how both the economic and the social sides of the *garimpo* system are key factors when explaining the resilience of illegal gold mining in French Guiana in particular, and in the Amazon in general.

***Garimpo* gold mining in the Amazon and in French Guiana**

Illegal gold mining appeared in colonial Brazil almost at the same time as formal mining. Following discoveries in the Arraial do Tijuco, the Portuguese crown established a royal monopoly on gold in 1731. But many individual miners did not abide by the law and continued to explore the riches clandestinely. They received the nickname of *garimpeiros* (“those who hide in the mountains”;¹ Salomão, 1984). Alongside appeared traders who provided them with supplies, accepted their gold in payment and smuggled it afterward into the legal system. Much of what the *garimpeiro* society still is today appeared at this time. The *garimpeiros* of the colonial era considered themselves free men working clandestinely, not outlaws. They did not attack individuals, nor ransack private properties. Defining themselves as a parallel society, they had norms ruling their communities which were to be followed, even if informal (Salomão, 1984). Their trade was dangerous, but it provided a livelihood and a small chance to get rich for people who were too brown and too poor – but not under slave status – to make it in the colonial Brazilian society.

Garimpeiros were good at escaping royal troops, dribbling expeditions meant to uproot them (Souza, 1982). At the end of the eighteenth century, when the first cycle of gold exploitation ended in Brazil, they stayed and continued to dig riverbanks, no longer a concern for the colonial and then imperial authorities. Most of the scientists who travelled in Brazil in the nineteenth century mention encounters with them (Larreta, 2002). They were also the protagonists of several small gold rushes, such as the one in the Cassiporé area, which provoked skirmishes between Brazil and France and eventually led to the delineation of the border between Brazil and French Guiana (Granger, 2012; Le Tourneau & Greissing, 2013).

Brazilian gold production was quite small at the beginning of the twentieth century – about 6 tons a year (Martins, 1984), and *garimpeiros* were a very marginal social group. They were mainly active in small regions such as the Gurupi valley in Maranhão and the Tepequem plateau in Roraima. In 1934, however, a new mining code entitled artisanal gold miners to work freely on public lands. Already tolerated, the *garimpo* was thus no longer illegal. However, it remained essentially informal since the *garimpeiros* did not register their small-scale and artisanal operations as formal enterprises. After World War II, their presence in the Amazon became much more prevalent. From 1952 on, a rush was staged around cassiterite extraction in Rondônia where, in the 1960s, about 15,000 miners were working (Théry, 1976). In 1958, in the Tapajos region, Nilson Pinheiro discovered important gold deposits in the Rio das Tropas (Wanderley, 2015). As the Brazilian government decided to claim exclusivity on Rondônia's cassiterite, almost reediting the 1731's proclamation, thousands of miners were put on unemployment in the wake of the 1970s and flocked to the Tapajos where they started a major gold rush, opening the second cycle of gold production in Brazil.

The 1970s were a time of innovation for Brazilian artisanal gold miners, who until then relied on traditional placer methods, some of them having potentially been introduced in Brazil by Afrodescendants and Mestizo people coming from Guyana (Cleary, 1990). The *garimpeiros* invented rafts and barges with irrigation pumps mounted on them, thus greatly expanding their capacity to work on major rivers. Around 1,500 of such rafts operated in the Tapajos around 1984 (Mathis, Chaves de Brito & Brüseke, 1997). They also modernized the monitor pressure jet technique. In a frenzy of exploration, *garimpeiros* found many other major gold fields in the Amazon, some of them in Indigenous areas (Barbosa, Lobato & Drummond, 1992; Le Tourneau, 2019, 2020). During the 1980s, Brazil became a major gold producer, extracting 122.6 tons in 1988, 74 percent of which came from *garimpo* areas (Cleary, 1990; Wanderley, 2015). 250,000 to 400,000 people directly derived their livelihood from artisanal gold mining in the Amazon (Oliveira, 2014). Mining camps and villages started dotting the region and informal mining was responsible for the surge of cities such as Itaituba (Kolen, de Smet & Theije, 2018; Godfrey, 1992). *Garimpeiros* also acquired some political power and were able to have

the government accept their presence in the famous Serra Pelada (Cleary, 1990; Abreu Monteiro et al., 2010). Many of the mining areas, however, were also quickly abandoned since artisanal exploitation is made of a quick succession of boom-and-bust cycles. Even during this period of fame, the *garimpo* continued as an informal world, most operations not being registered as firms and most contracts being only oral. Also, though artisanal mining is legal in Brazil on some public lands (Salomão, 1984; Le Tourneau, 2020), the *garimpeiros*, always looking for the richest areas, have also invaded many territories prohibited to them such as environmental protected areas and Indigenous territories. Therefore, a good part of the artisanal mining activity in the Brazilian Amazon was both informal and illegal, showing a continuance with the early beginnings of the *garimpo*.

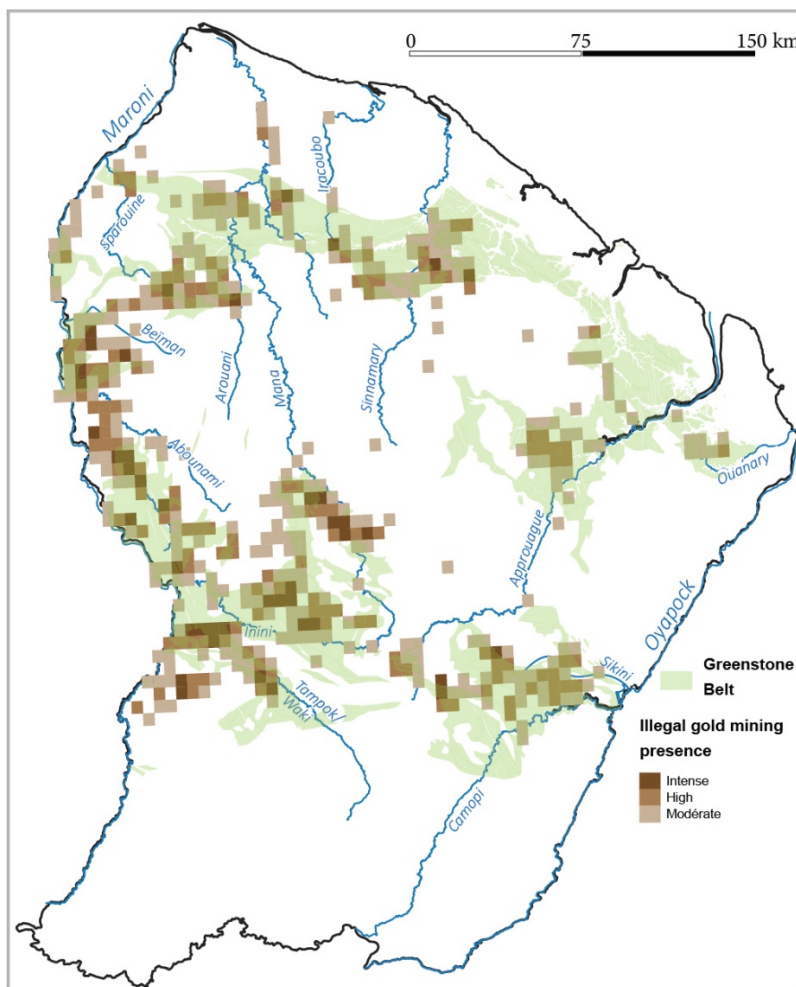
The 1990s saw a downfall for Brazilian *garimpeiros*. The international price of gold plunged and the authorities, who had been sympathetic to them until then, started to ask for more environmental compliance (Wanderley, 2015). Big operations were set to uproot them from Indigenous areas such as the Yanomamis' (Le Tourneau, 2010). Though the *garimpeiros* produced about 90 tons of gold in 1988, they only delivered about 10 in 2000. Ultimately, the activity resumed to a higher level, pushed by record gold prices and favourable attitude from the Bolsonaro government. According to the production figures released by DNPM,³ it has not, however, regained the levels of the 1980s. Parallel to its dwindling in Brazil in the 1990s, the *garimpo* system started to grow in the Guiana plateau. Brazilian miners appeared in Suriname during the civil war of the 1980s (de Theije & Heemskerk, 2009; de Theije, 2011). Over the next decade, artisanal gold mining based on Brazilian techniques and mainly carried out by Brazilians boomed there. About 8,000 Brazilian gold miners were active in Suriname in the mid-1990s (Veiga, 1997), and about 20,000 in 2010 (de Theije & Heemskerk, 2014).

The rise of garimpo activity and French authorities' reaction

At the end of the 1990s, informal gold mining also began flourishing in French Guiana, an area rich in gold deposits (McReath & Faraco, 2006; Thomassin et al., 2017). It had seen intense artisanal exploration from the 1860s to the 1920s, before the activity declined to the point of almost ceasing completely in the 1980s (Petot, 1986; Orru, 2001). A decade later, Brazilian-style barges started to multiply on the main rivers and the Brazilian two-motor system on smaller streams. After 2000, French authorities implemented a significantly more heavy-handed approach, forcing Brazilian *garimpeiros* to only operate in remote areas where they could not easily be caught. Facing the challenge of controlling about 87,000 km² of rainforest with a small police force, the French government mobilized army units to support the police from 2008 on. Called "Operation Harpie", this measure is still active today and leads to the destruction of hundreds of illegal motors, pumps and mining camps each year (Le

Tourneau, 2020). Despite this relentless pressure, Brazilian gold miners continue to haunt the jungle, in the same way that they are heavily active in environmentally protected areas and indigenous lands in Brazil.⁴ According to the French authorities, around 10,000 *garimpeiros* work in French Guiana and produce 5 to 10 tons of gold annually, most of it smuggled to Suriname (de Theije & Luning, 2016; Le Tourneau, 2020). Their presence broadly follows gold-rich deposit geological formation named greenstone belt (Figure 1).

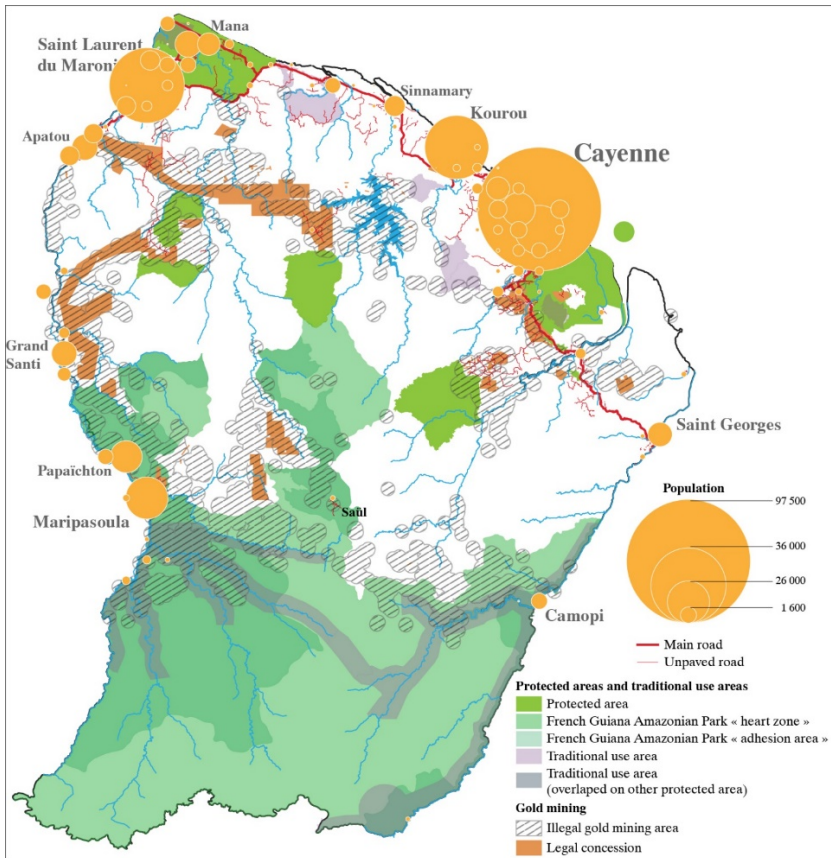
Figure 1. Illegal gold mining in French Guiana and the greenstone belt formation, by author



Aside from the fact that the *garimpeiros* illegally enter French territory, artisanal gold mining as practiced by the *garimpeiros* is illegal in French Guiana, where a strict environmental code for mining activities has been enforced since the beginning of the 2000s. Land tenure and protected areas (Figure 2) create specific contexts within this broad view of the situation. The whole southern

part of French Guiana is covered by a National Park (Parc Amazonien de Guyane, PAG), which is divided in two types of area, one where protection is strictly enforced (“heart of park zone”) and one where some sustainable activities – not mining – are possible (“adhesion area”). The PAG sees the *garimpo* as an existential threat and adds its own surveillance and repression activities⁵ to the police and military ones.

Figure 2. French Guiana’s population, protected and traditional areas, and illegal mining, by author



Source: French authorities for illegal mining, geoguyane.fr for the other information

Bordering the southern parts of the Oyapock and Maroni rivers, Indigenous or Maroon communities are also at odds with the *garimpeiros*' presence, constantly pressuring the government for action to root them out. This is the case of Indigenous Wayãpi and Teko communities on the upper Oyapock river and Wayana on the upper Maroni, with some illegal mining activity encroaching on their traditional use areas. This is also the case of Bushinengué (Maroon) communities along the Lawa and Maroni rivers. Their relationship with the

garimpo is more complicated. On the Surinamese side, where the activity is legal, those communities' leaders are compensated with 10 percent of the proceedings, and many Bushinengués men work as canoe pilots, transporting supplies for the mining camps. On the French side, there were Bushinengué mining operators in the beginning of the 2000s but they were forced out of the trade when stricter environmental rules started being enforced by the government (de Theije & Luning, 2016). Combined with the creation of the PAG, which Maroon populations have long seen as an authoritarian encroachment in their territory by the administration, this has made the issue of artisanal gold mining very contentious among these communities who see the activity of Brazilian miners as a pillage of their lands' wealth and therefore pressure the government to act on it. Maroon and Indigenous populations are also victims of mercury pollution originating from gold mining areas since their diet is heavily reliant on predatory fishes that concentrate mercury. Most of the *garimpeiros'* activity in French Guiana, however, happens in areas devoid of permanent population.

The conditions of the study

The world of the *garimpo* was the topic of several anthropological and geographical studies. Regarding Brazil, works describe the overall organization of gold rushes in the 1990s like Mathis et al. (1997), Cleary (1990), and MacMillan (1995). More recent works, many of them products of the GOMIAM project,⁶ document the evolution of the *garimpo* in the Amazon in the 2000s (Wanderley, 2015; Baia Júnior, 2014; Kolen et al., 2018). Some authors particularly focus on the sociology of the *garimpeiro* society, especially Larreta (2002), Tedesco (2015) or Kolen et al. (2013), while Wanderley (2015) focuses more on its geography inside the Pará state in Brazil. The migration of Brazilian gold miners to Suriname has been studied by Oliveira (2014), and De Theije and Heemskerk have extensively researched the organization of *garimpeiros* in Suriname, their relationships with local Maroon communities and health issues related to the intense mobility of Brazilian migrants between Suriname and French Guiana (de Theije, 2008; 2011; 2014; de Theije & Heemskerk, 2009; 2014). This last topic was linked to Suriname's malaria program because, though it has succeeded in controlling malaria on its territory, residual clusters continued appearing due to the constant exchanges between mining areas in Suriname and French Guiana. On French Guiana small scale gold mining, the organization of the *garimpeiros* and their techniques, fewer studies were published. Orru (2001) documents it at the beginning of the 2000s and De Theije and Luning (2016) provided a more recent image, but derived from interviews done with Brazilian miners traveling in Suriname. Due to difficult access and illegality, very few, if any researchers have had access to first-hand material and observations on the French territory.

Thus, several questions were left open: How are French Guiana's *garimpos* operated? Do they correspond to the Brazilian model? What is their degree of connexion with the outside world? What is the local population's participation in the activity? It is based on these questions that this study started. It also took advantage of an innovative partnership with the French Military, which was curious about the factors that made the *garimpeiros* so resilient to its efforts to root them out and therefore open to supporting research from the French National Center for Scientific Research (CNRS) on this topic. This arrangement evidently raises question about "embedded" research, which has a fraught history with the military (see embedded anthropology in the Vietnam of Afghanistan wars) or, in the case of mining, was the subject of controversies such as the one about the role of anthropologists around native communities and mining firms relationships, as demonstrated in the case of the Porgera gold mine in Papua New Guinea (Coumans & Kirsch, 2011; Burton, 2014). The main points that arise from these debates pertain to the type of information which is collected by scientists and its use by the other party, or the control and limits that embedded work might be submitted to.

To avoid the pitfall and issues raised by the "embedded geography" I was engaging in, a specific and rigid research protocol was put in place which defined the role of each partner. In it, the French armed forces agreed to grant access to their databases and knowledge about the *garimpeiros'* activities and provide safety and access to the field. CNRS had exclusivity when it came to research design and management, as well as the researcher's salary. The Army also had no say in the publication of the results, nor did they have proprietary rights. The objective of the research was defined as understanding the context and the global mechanisms of the *garimpo* in French Guiana, leaving aside intelligence elements that could lead to concrete action. The questionnaire that was elaborated, as well as all the elements collected in the field therefore, did not try to capture specific places and people's names, but rather to register general trends and mechanisms. None of my field material was ever in the hands of the Army to which I communicated only written reports. Finally, the agreed protocol stated that missions staged within this research would be completely independent from repression operations against the *garimpeiros*. The research would be done in regions that were not to be targeted for some time, and a delay of several weeks between the exit of each research mission and the next destructive operation was set and announced to the *garimpeiros*, leaving them time to reorganize if they felt our visit had compromised part of their organization. During the research, I was the only person conducting interviews, which were done on a free and voluntary basis, while installations and properties were left untouched.

The research was therefore not an exact "embedment" (i.e. having a researcher participating in the other partner's finalities and concrete actions with his or her own abilities), but a collaborative effort to gather new knowledge which could ultimately benefit the other partner in terms of general understand-

ing of the issue, not in terms of tactical action. I opted for this approach because of my previous knowledge of the *garimpo* world in Brazil. As a parallel society, the *garimpo* is characterized by a permanent suspicion of what comes from the outside. Trying to penetrate it informally would have been received as some lousy undercover operation (was I not actually paid by the French government?), resulting in difficulties in gathering valuable information and in potential physical danger – spying is not welcomed. On the contrary, coming under official operations made my status clear and somehow facilitated the interviews. The *garimpeiros* do not oppose French authorities, and they easily concede that they are “at the wrong place”. As de Theije and Luning (2016) underline, and as we have heard many times during the interviews, they consider that the French security forces are “very correct”, not hurting individuals and “only doing their job” when they destroy their property. Thus, the absence of an inherent hostility against the military has been a positive factor. Considering themselves as workers being forced into clandestinity, not outlaws, the *garimpeiros* are usually eager to discuss their trade.

It was thus perfectly possible to entertain a rich dialogue, facilitated by my familiarity with the Brazilian Amazon and knowledge of Portuguese (including the miners’ slang). During these four years of research, I have been able to conduct 275 formal interviews with miners and other service providers in ten different regions, as well as visit dozens of mining camps and villages. Since being snitched on is a big preoccupation for the *garimpeiros*, interviews were always run in public so that no one imagined that I was given “classified” information, which would have put the interviewees in danger. This was for the best since those attending the interview frequently completed technical explanations or joked about someone who was telling me improbable things: “come on, he’s not gonna take this one”. Names and precise locations were always left out of the conversation, which focused on non-contentious issues like life history, migration trajectory and technical details about mining or logistics. As people grew accustomed to my work, confidence grew as well, and people increasingly resumed working as usual when we were present, allowing me to witness almost all the trades of the *garimpo* world.

So, as opposed to the studies cited earlier that worked with Brazilian gold miners working in French Guiana but interviewed while they were in Suriname, my empirical material relies on *in loco* interviews and first-hand observations. I was able to visit mining shafts, placers and villages, and I could confront the information gathered during the interviews with the reality under my eyes. I was thus offered a rich and unprecedented window into an illegal activity, with explanations given by its primary actors. This rich field material was analysed quantitatively and qualitatively (Le Tourneau, 2020) and compared with the existing literature on the *garimpo* in Brazil and Suriname. It demonstrated how the *garimpo* is a coherent parallel world which operates exactly in the same fashion in the Tapajos region of Brazil and in the 2,500 km distant French Guiana.

Finally, it must be acknowledged that, in French Guiana, the *garimpo* is a source of conflict. In such cases, as shown by the Porgera mine's controversy among others, researchers might be tempted to take sides with one or the other of the parties. In the case of the *garimpeiros* in French Guiana and Brazil, the issue is extremely polarized since their situation can be depicted as little people trying to gain a livelihood despite government repression, but also as people knowingly engaging in a prohibited activity with high environmental impact, oftentimes invading and devastating Indigenous territories and national parks. In my fieldwork, I tried not to be influenced by any of these narratives and present the situation objectively without having to point out who's right or wrong, my findings contradicting many of the usual clichés which circulate in French Guiana about the *garimpo* (depicted either as a world of criminals or as a place where people are put into modern slavery),⁷ but also not hiding the violence or presence of criminality. To avoid partiality and conflict of interest, I also refrained from making judgements about Army operations and the Harpie measure, which I only use as the background against which the social facts I am describing happen.

Clandestine gold mining in French Guiana

The length of a single paper is not enough to go into details about the techniques and the inner mechanisms of the *garimpo*, but a quick background is necessary for the comprehension of its economic and social facets and describe the situation encountered in French Guiana.

Production modalities

The essential part of the *garimpo* system lays in the production segment: without gold extraction, nothing happens, and production fluctuations explain the alternation between rushes (*fofocas*) and downfalls (*blefes*). Three main modalities of extraction coexist depending on the terrain and the type of gold field. Placer mining on riverbanks and in small streams stages two motor pumps, one used to power a water jet which liquifies the sediments and another which pumps the mud and throws it in a sluice box.⁸ It was the most common modality in French Guiana until a few years ago and is still widely used. It is operated by a team of four to eight workers according to the motor's power. The barges use only one motor pump mounted on them to suck the sediments from the bottom of the riverbeds. They were widespread in French Guiana in the early 2000s, but as they are more vulnerable to the repression actions, they are rarer today. They are operated by smaller teams and necessitate the use of divers. In recent years, *garimpeiros* have turned more and more to pit mining on hills that are proven to be rich in gold veins. The pits can be up to 50 m deep and radiate underground from a central shaft (Figure 3). They are manned by teams of four workers who switch between digging underground and – mostly manually –

hauling the material to the surface. Sometimes two teams man the same pit, alternating day and night shifts. In all three cases, workers must coordinate their actions in order to be efficient and minimize multiple dangers.

Figure 3. Miner in a gallery in a “primary mining” operation



The final stage of exploration is gold extraction. For placer of barges which use sluices, with the use of mercury, gold flakes merge in heavier amalgamates which can ultimately be extracted using the iconic conic pans named *bateias*. For pits, the material taken from the shafts is crushed in portable mills and mixed with water. The product is flown on copper plates plastered with mercury, which captures gold flakes. The mercury-gold amalgamate is then grated from the plates. In all cases, the gold/mercury mixture is ultimately heated which makes mercury evaporate and leaves almost pure gold. This production process is very damaging to the environment. It releases huge quantities of mercury (twice the volume of the gold extracted), which is concentrated in the trophic chains and eventually contaminates the populations which are dependent on halieutic resources, such as Indigenous and Maroon communities (Gibb & O’Leary, 2014; ARS-Guyane, 2010; Esdaile & Chalker, 2018). Also, placer and raft mining dislocate huge quantities of sediments, destroying the fauna’s habitats and modifying the ecology of the streams downriver.

The importance of logistics and trade

Gold extraction requires lots of supplies: fuel, food, motors and their spare parts, pipes, pumps, etc. The *garimpo* thus needs a supply chain to acquire the necessary material and smuggle it up to the mining camps. This chain is composed of a variety of traders (generically called *mareteiros*). Some are specialized and others more generalist, and they are also highly diversified in the size of their business. Some of them are mere camelots, carrying a few hundred dollars' worth of merchandise on their back, others wholesalers juggling thousands of gallons of fuel. They rely on rivers and precarious trails to supply their camps. Contrary to a seemingly intact jungle, French Guiana is crisscrossed by a network of informal trails which makes it possible to deliver merchandise even in the most theoretically remote and isolated places. *Garimpeiros* regularly open new makeshift roads over dozens of kilometres for their ATVs, building precarious bridges over large streams if necessary (Noucher & Polidori, 2020). The supply system articulates rear bases (the cities of Oiapoque in Brazil and Albina in Suriname), forward bases (Ilha Bela and Vila Brasil on the Oyapock river, Ronaldo and Antônio do Brinco in Suriname), dozens of villages scattered across French Guiana gold fields and each and every mining camp. When needed (to bypass barriers set up by the authorities or cascades on a river), *garimpeiros* will employ brute physical force to carry supplies on foot trails for kilometres. The carriers, whose base load is 50 kg, are nicknamed "little mules" (*burrinhos*) or "tankers" (*petroleiros*).

Camps and villages

Mining camps (composed of the placer – *baixão* – or pit – *poço* – and the camp itself – *acampamento*) are the places where *garimpeiros* spend most of their time. They group small teams of six to a dozen workers, among whom a cook, always a woman. The workers are under the orders of a boss (*dono*) and their task is to perform any action linked to gold extraction, including quickly hiding all equipment from the police when they come. The boss is the owner of the machinery and the one who organizes the extraction, often taking advice from experienced workers. In contrast to camps are villages, called *corrutelas* (an eighteenth century word still in use), where workers spend the gold they earned, either buying items (better food, personal care products, etc.) or entertaining themselves in saloons which generally also act as brothels. As Tedesco (2015) points out, the dichotomy between the workplace and the leisure place is a defining feature of the *garimpeiro*'s life. Villages also act as logistic hubs where one can find pretty much everything that is necessary to run the extraction, and they supply a diverse array of services (from restaurants to jeweleries). *Garimpeiros* try not to spend much in infrastructures since their presence is always temporary, all the more so in French Guiana where the police regularly destroys them. Most of the constructions are makeshift shelters made of

poles and tarpaulins – plank houses are seen only in the richest regions. Those shelters provide, however, sufficient comfort for the miners to spend months or even years in the jungle. With a very developed sense of workmanship, the *garimpeiros* are able to substitute most commodities that cannot be shipped to them. They produce their own charcoal, cookers, furniture, etc.

The economic facet of the *garimpo*

As the *garimpo* is chiefly concerned with extracting and selling natural resources (e.g. gold), the economic side of the system is obviously critical. It is, however, more complex than often imagined, with several mechanisms which help neutralize the uncertainty which is inherent to artisanal – and illegal – mining.

The “society” as a fluid device for the capital/work interaction

In French Guiana, as in all areas where the Brazilian *garimpo* reigns, the boss/worker relationship responds almost exclusively to a model called society (*sociedade*, also called ‘working for percentage’ – *na porcentagem*), in which the boss is responsible for making the camp and the exploitation run, and the workers (also known as associates) contribute with their work in exchange for a share of the production. The distribution is in general 70 percent for the boss and 30 percent for the workers (oftentimes 4-5 people, so that each worker gets 6-7.5 percent) or 60/40 percent on the barges since they consume less fuel and involve more risks because of the diving. This can seem unfair, but the boss is the one who risks his investment and who pays for all the supplies (including the workers’ food and the cook’s salary). The total of these costs may surpass his share if the area yields too little, whereas if any gold is extracted, the workers will get some since their share is normally taken before any other costs are paid. On the other hand, obviously, if the area is rich, the boss makes much more than the workers. The society system is commonly reproduced across the supply chain. Logisticians can thus hire pilots for their ATVs and canoes using the same 70/30 percent distribution of earnings. Otherwise, services are paid at a fixed price. Wages and fixed salaries are now very rare in the *garimpo*. Cooks were paid a fixed sum up to a few years ago, but now receive an amount corresponding to the workers’ share, taken on the boss’ amount.

The ‘society’ is very fluid, based on an informal understanding. It lasts as long as the boss provides food to the camp, or until one of the parties decides it is over. The freedom to leave at will that workers enjoy represents a difference between today’s *garimpo* and some descriptions from the 1980s. At that time, extraction areas were more isolated, and some bosses could act as warlords, eventually forcing workers into a kind of slavery. Most people that I interviewed referred to this era when “the *garimpo* was fierce [*brabo*]”, in opposition to today’s *garimpo* which is “sweet [*manso*]”. In French Guiana, cases of

“fierce *garimpo*” are very rare and usually linked to the presence of armed bands. The ‘society’ allows for a fluidity in the workforce which explains why there are always people touring the camps just to see if there is a spot to be taken because someone abruptly left, thus objectively constituting a reserve which can respond promptly to any work demand. It also drastically diminishes fixed production costs since workers are paid only when and if gold is extracted. It finally creates a certain balance of power between bosses and workers. If the former have capital to invest, they cannot produce without the latter. It is then not rare to see a boss continue to supply food to a camp even when production is paused in order to maintain his workforce in place. Failing to do so will have workers disband at once, and he may have a hard time rebuilding a team. Workers, on their end, do not consider themselves employees, but associates. In their eyes, the *garimpo* guarantees freedom and a mobility that they could not enjoy in the formal economy.

Neutralizing risks: inflation, credit and dumping

Being a crude capitalist system which does not take into account social or environmental costs, the *garimpo* responds strictly to supply and demand, with the additional factor of risks linked to clandestinity: the higher the demand and the risk, the higher the price. Inflation runs high along the supply chain, making the cost of any item grow up to tenfold from the city to the camps where it is consumed. Risks increase with longer distances for the transport of merchandise. Prices are then higher in areas deep inside French Guiana and cheaper near its borders where canoes can easily cross from Suriname and Brazil. In the upper Mana and along the Inini, for example, prices can be sky high: up to 500€ for a 50 liter can of gas, up to 10€ for a kilograme of rice, all paid in gold of course (table 1). These prices dialogue with those exposed by De Theije and Luning (2016) and show that if the geography of prices can be moving, its determinants (distance, pressure put by authorities in a given sector, discovery or exhaustion of gold deposits) are stable. Even if some transactions are made in cash close to the external bases on the Maroni and Oyapock river, gold is the exclusive currency inside the extraction areas.

As production is irregular, most bosses are not able to pay for their supplies when they are delivered, and most workers also need to buy items and services before they receive their pay. Credit is thus another key of the *garimpo* economic system, its “lubricant” (Cleary, 1990), and it is not centralized. As also pointed out by De Theije and Luning (2016), almost everybody is both creditor to people to whom they lent something and debtor to someone from whom they borrowed. Of course, credit is conceded in accordance to each person’s reputation, which is a powerful incentive not to flee without repaying one’s debts. The *garimpo* is a small world and someone with a “dirty name” (*nome sujo*) would surely be ostracized even a thousand miles away. Credit is given without fixed delays (“It is useless to ask money from someone who cannot pay”) or

interest rates. It works on the simple principle that a debt has to be repaid, some day.

Table 1: examples of prices in different regions for two basic products (the price of 1 gram of gold was 40€ in average during the research, it is over 50€ in 2021)

Region/product	Rice load (30 kg)	Fuel barrel (200 l)
Belizon/Crique Mazin	2.5 g along the access road 5 g at the camps	25 g along the access road 37-40 g at the camps
Sophie	10 g	60 g
Eau Claire	4 g	45 à 50 g
Pé de Limão	4-5 g at the port 7 g at the camps	25 g at the port 40 g at the camps
Grigel	5 g	34 g at the port 41 g at the camps
Sikini	3 g	25 g after bypass trail 50 g at the camps
Approuague	5 g	35 g
Goyanol	5 g	30 g
Pega Voando (Abounami)	4.5 – 5 g	25 g

Needless to say, jobs in the *garimpo* do not include social or health benefits. These costs are externalized to surrounding societies: wounded or ill *garimpeiros* are treated for free by French hospitals and dispensaries under humanitarian considerations and many old *garimpeiros* rely on Brazil's basic rural retirement for their living. In the same way, ecological costs are externalized as environmental restoration or limitation of environmental damage is ignored. One can analyse this as both environmental and social dumping since these costs are not supported directly by producers but left for surrounding societies to pay, which allows to lower their production costs and makes the *garimpo* interesting financially. Should those costs be included, it would surely not.

Finally, facing repression, bosses are obsessed with reducing exposure. They thus tend to use cheap and less powerful motors made by Chinese brands, even if they are more fragile, because they are easy to replace and reduce the investment. They also cut on fixed costs. For instance, they switched the cook's salary from a fixed amount to a share of the yield, which, according to the women who are employed, is not necessarily a good deal since it means the loss of the regularity of their income. However, as some others pointed out, the theoretical regularity of fixed wage was far from their reality since bosses who did not make a good production would sometimes not pay them for several months, promising that they would give them all their earnings at one point and not always fulfilling their word. Also, being associated like the other workers can bring a far greater income in case the production is high.

A real chance to get rich – and even more a chance of not

Based on the figures the *garimpeiros* have been giving me about yields, production costs, etc., I tried to calculate how much they can expect from their activity in French Guiana – based also on the idea that they must have a good objective reason if they are still engaging in it despite the heavy-handed repression they face. Obviously, in doing so, I was trying to evaluate averages along periods of time (like one year) whereas the *garimpeiros*' perception is much more based on day-to-day earnings, highlighting some very good ones and forgetting about the many other lousy ones in what Larreta (2002) calls their “non-linear relationship with time”. The chance factor should also be considered. Finding an exceptional gold field can make people rich in a few weeks, but most will spend years not finding anything that really compensates for their time. *Garimpeiros* are thus much closer to casino players, always convinced that they are going to win big and forgetting about the previous night's loss, than to wage earners investing regularly in their savings account.

That being said and considering that the international price of gold has almost continually been at record highs for the last decade (and even more today in pandemic times), the results of my calculations seem to prove that there is some rationality in trying to find a livelihood by involving oneself in *garimpo* activities in French Guiana. Table 2 presents the figures I obtained for placer mining. Counting only 150 days of work in a year (because a lot of time is unproductive, spent hiding from the police or waiting for motor parts), miners can do about 15 extraction cycles (from the moment they start working a riverbank to the moment they perform the final stage of gold extraction from the sluice).

Table 2: costs and profits of a placer mining operation (author's calculations)

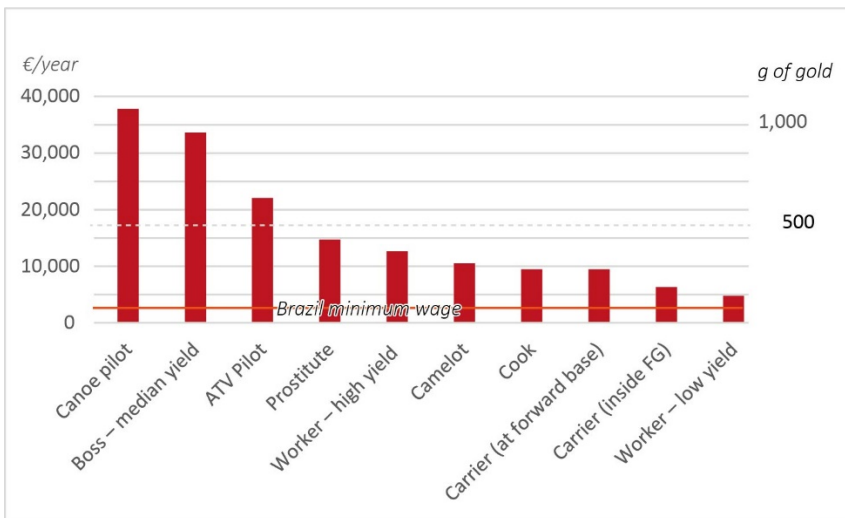
Production cost/Yield	Low (150 g / cycle)	Median (250 g / cycle)	High (400 g / cycle)
<i>Fixed costs</i>			
Fuel	900	900	900
Mercury	22,5	37,5	60
Parts&miscellaneous	100	100	100
Food&supplies	600	600	600
<i>Variable costs</i>			
Workers	675	1,125	1,800
Cook	135	270	270
Gold extracted	2,250	3,750	6,000
<i>Boss' profit</i>	-182,5	717,5	2270

If the average for each cycle within a year is inferior or equal to 150 grams of gold (a really low quantity according to the interviews), the boss loses money,

but his workers still share about 600 grams of gold for a year’s work. If the average yield is a plausible 250 grams, the boss earns about 700 grams and the workers share 1.125 kg. If the average reaches 400 grams (high but not at all impossible), the boss has a profit of more than 2.2 kg of gold. In this situation, he can invest in land and cattle in Brazil – in the same way described by Cleary (1990) and McMillan (1995) or buy another couple of motors. He also has enough to repay his machinery if it gets destroyed during a police operation. It is worth noting that, whereas inequality between workers and bosses is often pointed out, the difference between them is not that high and in any case much less than the difference in wages between workers and bosses of the new economy firms, such as Uber and Amazon.

In every trade of the *garimpo* (commerce, prostitution, bars and restaurants, ATV or canoe piloting, etc.), yields are demonstrably two to three times or more the Brazilian minimum salary, sometimes much higher (figure 4). However, as said, such gains are very variable across time and individuals. Many might fare the same or slightly better at home with a low paid but regular job. But as one woman put it “they prefer to have a small taste of what it is to be rich, even if it lasts only for a glimpse, then becoming only a little less poor”. In the same vein, Larreta (2002) interprets the workers’ excessive spending during their parties as a way to make themselves equal to rich people for a little while.

Figure 4: yearly income, based on author’s calculations; gold/€ conversion based on an average price of 35€/g and comparison with 2019 Brazilian minimum salary



According to fieldwork data, the investment to set up a placer or a pit is between 300 to 600 grams of gold (12,000 to 24,000€),⁹ the one to set up a commerce in a village between 100 to 200 grams (4,000 to 8,000 €) and the investment in a load of merchandise to be sold by colporteurs even less. These

investments can be repaid in a few months if business is good. This partly explains why the French authorities' strategy to bankrupt the *garimpeiros* has had mixed results: when a business folds, it opens a niche where another individual can enter, and as the amount to be invested is small and as it is potentially repaid quickly, there is no want of candidates eager to risk it – especially since they can at least partially rely on credit. Not everyone, however, makes it and the *garimpeiros* develop an ambivalent perspective about their activity. Many describe it as their only option because they are uneducated and unfit for the formal economy. Many others also talk of it as a “cruel illusion”, in comparison again to compulsive gamblers who know they can not really win but still hope that this time will be the right one. Traditionally, the chance factor associated with gold exploration was explained by the gold having its own personality and choosing who will find it, just like a woman who lets a man approach her or not (Tedesco, 2015; Barrozo, 2017). In return, the true *garimpeiro* has to adopt certain behaviours: be generous, spend a lot when striking big, etc. Even if such views are still part of the folklore, many younger gold miners see things differently today, valuing the fact of saving money and investing their earnings back at home whenever they can. Interviews showed a difference in this respect between the workers, where the old model persists more, and the other professions.

The *garimpo* society

The social system of the *garimpo* accomplishes the prowess of reconciling two fundamental opposing features: on the one hand individualism, since each person hopes to enrich themselves personally, even if others do not; on the other hand, solidarity and cooperation.

Who are French Guiana's garimpeiros?

The *garimpeiros* who work in French Guiana are overwhelmingly (98 percent, according to author's statistics) Brazilian. The participation of Suriname's Bushinengés is restricted to trade in the areas close to the Maroni river and French Guiana natives do not engage in the *garimpo*, probably because French social benefits make it much less appealing. Mining camps are thus 100 percent Brazilian universes, with Globo TV and Brazilian brands everywhere. Brazilian predominance can be explained because the *garimpo* is not an unusual option in the Brazilian Amazon when people are in need of money. Therefore, everybody knows someone (a relative, a friend, a neighbour) who went to the *garimpo* and came back with some – sometimes lots of – money. These examples were inducers for most of the people I interviewed. Also, such proximity makes it easy to ask for guidance (about where to go, how, contacts, etc.) and learn the principles of the *garimpo* (such as the ‘society’ model with bosses, how trade is done, etc.).

Most *garimpeiros* who participated in this research (59,1 percent) come from the state of Maranhão, followed by the state of Pará. Maranhão is the poorest state in Brazil and the most rural (36 percent of the population in 2010 according to IBGE), which can explain why it acts as an endless reservoir for the type of physically hardened workforce gold extraction needs. When looking at younger (under 30) people, the share of those coming from neighbouring Pará and Amapá increases, which reflects the fact that people from Maranhão started migrating to those places, as well as the growing demography of these states. Overall, about two thirds of the population are males, and one third females. In the camps, work is predominantly masculine, cooks being the only women present in general. The average male/female ratio is therefore close to 80/20 percent. In the villages, many of the traders are women, and there are also many women employed in the entertainment sector (waitresses, sex workers, restaurant owners and cooks, etc.). So, the proportion of women is much higher. Bosses, business owners, workers and employees share the same social background, with upward and downward social mobility being frequent and quick. People can rise and go bankrupt (because of repression, but also because of bad luck in finding gold) in months, starting from zero again afterwards.

As already observed in many studies (especially Oliveira, 2014 and de Theije and Luning, 2016), geographical mobility is a defining feature of French Guiana's *garimpeiros* as well. They oscillate between times "inside" (*dentro, no mato*) and pauses in the rear bases or at home in Brazil. Those who can afford it return every year, in general around Christmas. Most of them take a breather from their work every couple of months. For this reason, spaces of transit (like hotels) are important hubs for their sociability as well, as also noted by Tedesco (2015). But even when in the jungle, they tend to move a lot. Workers will change areas they work in frequently, hoping to find a place where yields are better. Traders and service providers will reconfigure their business when a new field is discovered.

As proven by the median age (39), the *garimpo* is not a young man's trade. Most of the people are between 20 and 50, with some over 60. These figures are quite aligned with Oliveira's (2014) for Suriname, and it may be that young people are relatively rare because, on average, they are more educated than older generations and so less prone to envision mining as appealing compared to other opportunities. While *garimpeiros* under 40 frequently only worked in French Guiana, two thirds of those over 40 have worked in other areas in Brazil. About one third of the people I interviewed had started working in French Guiana before 2008, and approximately 16 percent were in their first or second year. Extrapolating this figure, it is possible that about 500-700 *garimpeiros* arrive each year in French Guiana for the first time and that most of them will continue to do so permanently or intermittently for about ten or twelve years.

Not all *garimpeiros* are full time and one can draw a line between 'hard-core' and 'intermittent'. The former spend years in the camps and villages and have lost most of their ties outside. The latter only come for limited periods of

time (a few months, never more than one or two years) in order to earn the money they need to repay a debt or to make an investment back in their home city or village – in general their goal is 100-200 grams of gold. Intermittent *garimpeiros* make about one third of the total, but they are more frequent within the traders or the service providers and less within the base workers (*peões*). They are less prone to make the *garimpo* their only horizon in life and will value more the possibility of capitalization offered by it and less the traditional *garimpeiro* values referred to earlier. The presence of this category goes strongly against the clichés about *garimpeiro* miners are disenfranchised people or marginals, since their activity in the *garimpo* is on the contrary a support to the other facets of their life in Brazil (like shop-keeper, small farmer, etc.).

Rules, norms and violence

The *garimpo* has a bad reputation in Brazil and in French Guiana. Once seen as a romantic escape from the industrialized world, it has increasingly been considered as a place of lawlessness, human trafficking and crime from the 1990s on (Tedesco, 2015). Though they do not deny the presence of violence and crime in the clandestine mining areas of French Guiana, my interviews give a different picture. Though there is no formal code in the *garimpo*, people tacitly accept a set of rules and norms that permits the cooperation between the individuals and creates a cohesion. It is a sort of response to the “insecure sociality” defined by Eriksen (2010) and also to many other insecurities encountered by the *garimpeiros* such as income, health, personal safety, etc. (De Theije & Bal, 2010). Since there is no close geographic, ethnic or social homogeneity between *garimpeiros*, and since they are located out of reach of formal institutions, they cannot rely on pre-existing codes to frame the admitted and inappropriated behaviour and interactions. This is where the code of conduct embedded in the *garimpeiro*'s identity provides some security, allowing individual and businesses to thrive. As a miner put it: “people think there is no law in the *garimpo*. The fact is that there is probably more law in it than in the city.”

The overarching principle is solidarity, which is demonstrated by the fact that every boss will consider it his duty to feed any individual staying at his camp overnight, regardless of his/her status. If the person stays for a while, she will be asked to contribute to some daily chores, such as fetching water, but no payment will be asked if she can not pay because “where there is gold there can not be misery”. The *garimpeiros*' reference to the “law of the jungle” thus does not mean “the law of the strongest” (a frequent cliché) but this solidarity, which also implies helping your neighbour in case he needs to promptly remove his machinery, lending spare parts if someone has a broken motor or pump, etc. This solidarity extends frequently to neighbouring legal operators as well, and also, sometimes, to French authorities when, for instance, they stage search and rescue operations in the jungle. Solidarity is evidently self-serving as well. Everyone in the *garimpo* will at one point need the help of others. Bet-

ter then to have some credit already when it will be your turn to ask for it. But, as Neves and Du Toit (2012) point out when they explore the socialities of informal economy in South Africa, the neoliberal vision of profit maximization inadequately captures the potentially multiple objectives of solidarity in the *garimpo*. Building a network of “people of trust” is equally important as these persons play a decisive part during all of a *garimpeiro*’s stay in the mining areas.

The *garimpo*’s informal code includes many aspects of social and economic relationships between individuals as well, such as the principles of ‘association’ and what is or is not included in each job’s chores. Hence, doing the laundry (or, contrary to common belief, proposing sex services) is not part of the cook’s duties. Those are extras they may or may not perform and will be paid for in addition. Despite the existence of rules, violence is not absent. As the *garimpo* is a parallel and mostly clandestine world, it is out of reach of institutions like the police and justice. Rules and norms are mostly expressed in indirect ways, such as repetitive affirmations that “there is no such thing as a thief in the *garimpo*” or “here there is no rape”. As Tedesco (2015) underlines, those are not observations but clear warnings. Punishments happen from time to time when an individual is caught doing such things. They are not codified and in general spontaneous but are most of the time extremely violent and can be recorded on cell phones so that everybody remembers and is warned. Many *garimpeiros* (including many women), however, have adamantly stated that they felt their area was “very quiet” in this respect, characterizing violence as typical only of a one or two zones under the control of armed gangs.

This can be explained, in the first place, because the *garimpeiros* are mostly working-class or poor people who live in underserved suburbs or in remote rural areas of Brazil. Violence (in all its forms, domestic, criminal, etc.) there can be widespread, which makes their perception of it quite different from the upper classes of society. Also, as is frequent in parallel societies, individuals – especially males – are keen to maintain their honour, which is a big part of their social capital. An offense is considered a justification (and a call) for violent actions in order to restore it (Tedesco, 2015; Larreta, 2002). Counter-intuitively, this acts as a device which helps lower the overall level of violence. Since everyone can potentially claim and exert revenge on another if he is somehow offended, one has to tread lightly in social relationships. Being physically strong does not minimize the risks since hunting rifles are widespread and since anyone can easily be ambushed in the jungle.

Even if the punishments I have been referring to are sometimes collective, most of the violence in French Guiana’s *garimpos* occurs between individuals. As one woman said: “*Garimpeiros* can kill to avenge personal offenses, but collectively organized resistance is not their thing”. This leaves them in a paradoxical position when it comes to the armed gangs that periodically racket the richest areas: often considered armed and violent in French Guiana, the *garimpeiros* are however unable to oppose them and those who dare resist are

eliminated one by one. These armed gangs, which deploy insane levels of violence to rule (Le Tourneau, 2020), are considered as a plague by the *garimpeiros*, who consider that their members are “thugs and not miners”. Many of them, however, come from the *garimpo*’s labour force, while others come from Brazilian cities where they were already engaged in organized crime.

Decentralisation, individualism and the garimpeiro identity

Solidarity and enforcement mechanisms do not mean that there are no individualistic strategies. On the contrary, success and failure are considered personal, and people deploy individual strategies, sometimes to the point of betrayal, such as bosses bargaining information about others in exchange for being spared by the police (which has to be done very discretely because of possible revenge). Individualism in French Guiana’s *garimpos* is echoed by decentralisation. Some bosses may run several camps, but there are no mafia-like “big bosses” overseeing the extraction areas. There might be some prominent commerce owners on the outside, but they act much more as banks, lending credit or investing their money in camps, than they effectively control who does what and where. Decentralisation is a major advantage when it comes to facing repression since camps will not fall as dominos when one boss disappears. On the contrary, people still in the area will reorganize spontaneously and fill the void.

The *garimpeiros*’ capacity to act cohesively without formalized organization, while having an individualistic view of his/her trajectory, is paradoxical. Based on my empirical material I tend to see it as a product of the *garimpeiro* cultural identity. It is inclusive, not acquired by birth or selection, but merely by engaging in one of the *garimpo*’s trades. As soon as people claim it, they can count on the solidarity of the others as their best protection, since the *garimpo* is at its core a society under pressure by the authorities. Also, it works as a morale resource. *Garimpeiros* unanimously claim they are “free workers and not outlaws”, rejecting the reason of their clandestinity on an unfair social system which prevents them from accessing what is their right, i.e. extracting gold wherever it lays. Associated with this comes the pride of doing a physically difficult and dangerous job: “we do not do this for money or women [...]. We do this because we are proud and we respond to challenges.” said one. Underlined by de Theije (2011), this pride about their way of life makes their marginality attractive. As one woman said: “it is not money, it is life in the *garimpo* itself that retains you.”

The *garimpeiro* identity also embodies all the norms and rules detailed above and structures the *garimpo*’s economic and social systems. It thus works as a cement which blends individuals into a workforce which can work in a network of areas separated by thousands of kilometres: the *garimpo* is the same, whatever the place. Finally, this identity naturalizes the individual side of success as the rule of the game, successfully resolving the contradiction be-

tween the indispensable cohesion against the exterior and individualism of financial gains.

Conclusion

Until now, actions by French authorities against the Brazilian illegal gold miners in French Guiana were able to substantially curb their operations, but they are far from uprooting them. Based on the empirical material accumulated throughout four years of research, I analyse this as a consequence of the fact that the *garimpo* is not only an economic activity, but also a parallel social universe built specifically to be resilient to repression and to neutralize the high risks of clandestine exploitation. As such, it gives to the *garimpeiros* what are the three keys of resilience (Keck & Sakdapolrak, 2013): a capacity to cope with repression actions, especially by allowing a diversified and otherwise unconnected workforce to act coherently; the capacity to adapt to police forces' actions, guaranteeing a high reward in case of success, and moral and social resources for the individuals to start from scratch when they are broken; the capacity to transform because the *garimpeiro* identity works as a backbone, allowing individuals to blend into a coherent work organization while retaining their individualistic trajectories, not as a uniformizer or a rigid shell.

The *garimpo* system, furthermore, connects a wide network of areas across the Brazilian Amazon, French Guiana, Suriname and Guyana in which *garimpeiros* circulate and communicate with each other regardless of the country they are located in. As De Theije and Heemskerk (2009, p. 8) put it: "Guyana, Suriname or French Guiana are not thought as separate nations; they are just other *garimpos*". On his side, Oliveira (2014) stresses that international borders are viewed as mere obstacles that impose some bypass and not as impassable lines. The *garimpeiro* system operates exactly the same way in those places and this allows the miners to jump from one place to another, being immediately able to work in any of them. In this continental vision, each place has pros and cons and *garimpeiros* choose to go to one according to their personal strategy and connections. Brazil is considered an interesting place because there are many areas rich in gold, but dangerous because the police can be really tough, and because there is an increasing presence of city gangs in the *garimpo* areas. Suriname is a quiet place, but the yields of its gold fields are considered less interesting and the *garimpeiros* have to pay a 10 percent fee, lowering profits. French Guiana has high-value gold fields, but the probability of having one's material destroyed is high. The local police, however, is "educated", which makes the physical risk low.

Far from being a reminiscence of a past which is slowly fading, the *garimpo* is all the more active now in the Amazon that gold prices are very high, and that the current economic crisis leaves many people unemployed. New modalities exist which compete with the traditional system, especially increasingly highly mechanized artisanal extraction, which uses big excavators and tends to

employ wage workers. However, there are still hundreds of thousands of people involved in the traditional *garimpo*, and since the economic and social system which structures their world is designed to be resilient, one can predict that they are not going to disappear any time soon.

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Notes

- 1 The word *garimpeiro* probably comes from *grimpa das serras*, that is mountain ridges, where they would hide (Salomão, 1984).
- 2 To give a comparison, the famous Klondike gold rush only produced 42 tons.
- 3 Anuário mineral 2020 and Sumário mineral 2018.
- 4 The Bolsonaro government is overtly favourable to the exploration of protected areas by the *garimpeiros*, but laws have not changed, and the Federal police and the environmental administration regularly stage *antigarimpo* operations, and then they are sometimes punished for that by their own ministers.
- 5 The park's police can enforce environmental laws since 2015.
- 6 See gomiam.org
- 7 Examples can be found in May (2007) or Gris (2018) as well as in most of the press articles published in French Guiana about illegal gold mining.
- 8 This system is called *par de máquinas*.
- 9 Based on a price of gold of 40 €, which represents a median value for the four years of the study. Gold prices are highly variable, they reached more than 55 €/g in the middle of the Covid-19 pandemic and average 48 €/g in the Fall of 2021. There are two caveats about this conversion. First, equipment and merchandise are in general paid in gold, so it is gold which is the relevant metric and not its value in any currency. Second, the price of gold varies a lot, so depending on when the quotation is made, the value can be very different whereas it is stable in terms of gold grams.

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