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Changes in labor relationships and in gold mining production models in Tapajós region

As mudanças nas relações do trabalho e dos modelos produtivos da garimpagem de ouro na região do Tapajós

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ABSTRACT: The aim of the current article is to investigate how labor relationships have developed along with technical changes taking place in wildcat gold mining camps (‘*garimpos*’) in Tapajós River’s channel, from the perspective of people who have worked in them, from the 1950s to the 80s. Secondly, the article is also an analysis on how social organization, morality-production practices and wildcat gold miners’ perceptions about using natural resources collided to the new environmental paradigms observed from the 1970s, on. The analysis method gathers the collective memory of former gold miners and theoretical studies about the political contexts, legal frameworks and issues linked to both artisanal and small-scale mining. It is possible observing the economic front of mining as injunction condition, despite its economic relevance for cities and communities in the region. Given its high capacity to absorb manpower, the mining economy is based on informality and illegality conditions, and its production methods have great potential to degrade the environment. Products used in mining procedures and their waste significantly harm the aquatic ecosystem in Tapajós basin and threaten food security of both traditional communities and mining-zone neighboring settlements. Despite the standards set for this mineral exploration modality, the State has been incapable of effectively controlling and regulating small-scale mining in the country; still, there is a long way between prescription and practice in Tapajós’ mining.

Keywords: small-scale gold mining; labor relationships; memory; environment.

RESUMO: O objetivo deste artigo é compreender como se desenvolveram as relações de trabalho, em compasso com as mudanças técnicas ocorridas nos garimpos de ouro na calha do rio Tapajós, sob a perspectiva de pessoas

que neles atuaram nos anos 1950 a 1980. Secundariamente, o artigo analisa como a organização social, as moralidades, as práticas produtivas e as percepções dos garimpeiros quanto ao uso dos recursos naturais colidiram com os novos paradigmas relativos ao meio ambiente a partir da década de 1970. O método de análise articula a memória coletiva de ex-garimpeiros e estudos teóricos que discutem os contextos políticos, marcos legais e problemas que circundam a mineração artesanal e de pequena escala. Percebe-se a frente econômica da garimpagem na condição de liminaridade, apesar de sua relevância econômica para as cidades e comunidades da região. Com grande capacidade de absorção de mão de obra, a economia garimpeira estrutura-se em condições de informalidade e ilegalidade, e seus métodos de produção apresentam alto potencial de degradação do meio ambiente. Produtos utilizados nos garimpos e rejeitos deles derivados prejudicam significativamente o ecossistema aquático na bacia do Tapajós e ameaçam a segurança alimentar das comunidades tradicionais e povoados vizinhos às zonas garimpeiras. A despeito das normas referentes a essa modalidade de exploração mineral, a União tem sido incapaz de controlar e regular efetivamente a mineração de pequena escala no país, e resta uma distância imensa entre a prescrição e a prática nos garimpos do Tapajós.

Palavras-chave: garimpo de ouro; relações de trabalho; memória; meio ambiente.

1. Introduction

At the late 1950s, gold deposits were discovered in the Tropas river and in the Tapajós river channel, in the municipality of Itaituba, Southwestern Pará. These findings attracted large contingents of workers, transforming auriferous exploitation into an important economic front, in the context of development, occupation and integration policies of the Amazon to the rest of national territory (Salomão, 1984; Cleary, 1992; Mathis, 1995; Becker, 2007). The main purpose of this article is to understand the labor relations in gold wildcat mining camps *('garimpos')* of the Tapajós region, from the perspective of people who worked on them, from the 1950s to 1980s.

To achieve the outlined objective, this text is organized in four sections, in addition to this introduction and final considerations section. The next section presents a brief contextualization of the development policies carried out by the Brazilian government since the 1930s. Although this period is outside the time frame delimitated in this article, return to Vargas' era (1930-1945) and Kubitschek's government (1956–1961) is essential to provide context to the processes occurred on small-scale gold mining ('*garimpagem'*), from the 1950s onwards.

At the sequence, we seek to understand these processes from the perspective of ten former wildcat miners, residents in Santarém municipality (Pará state), whose ages range from 55 to 83 years. The first interlocutors of the research were contacted through a relative of one of the authors, also a former gold wildcat miner, and, from then on, they indicated the others. All of them were interviewed between 2016 and 2018, at their respective residences, and all interviews were recorded in audiovisual format.

The third section, specifically, highlights trajectory aspects of the oldest of the interviewees, whose account serves as a guiding thread to introduce the theme of the changes occurred in the *'garimpos'*. The fourth section mixes memories of the ten men, reflecting the subjective dimensions of their experiences in the work environment and the

sociability relationships they maintained at different times during their mining practice and their own life trajectory. Through their biographical narratives, they report their expectations, techniques and forms of interaction cultivated in communities formed from wildcat mining activities of Tapajós River.

Taking into account that memory is always produced at the present, under the memory dialectics (Nora, 1993), biographical narratives collected also reflect the conditions in which the interviewees frame the past from their own process of biological oldness and change of social status related to it (Elias, 2001). Besides this, the reports registered discourse about experiences and episodes lived in individual trajectories, but which are common to the group, repeating themselves with small variations. The memories of ones find support on others' memories, and, together, they refer to the political contexts, legal frameworks and problems that historically surround small-scale mining in the Tapajós (Halbwhachs, 1990).

Against the backdrop of relations and work techniques, the fifth section analyzes, in a secondary way, how the moralities, practices and perceptions of the wildcat miners, as a social group, regarding the use of natural resources collided with the new paradigms related to the environment from of the 1970s. The conspicuous consumption practiced in bars of the '*corrutelas'* by wildcat miners, supported by the belief in the infinity of gold in the soil; the low educational levels; the recurrent reports of violence that occurred in the mining camps; the rudimentary machinery for processing gold, the fearlessness in face of the dangers of an inhospitable environment, and insurgency in face of current laws have become the benchmarks of small-scale gold mining for outside society and for environmental management bodies. These factors led to transformations in the legal field, with the creation of laws, decrees and ordinances with the objective of controlling the productive modality carried out in the garimpos.

2. Development policies in the Amazon

Development policies launched in the 1930s, during Getúlio Vargas' office (1930 – 1945), remained active during President Juscelino Kubitschek's management (1956 – 1961), and they were significantly broadened during the military regime in Brazil (1964 – 1985). The political processes experienced between 1930 and 1985 have marked the progressive domain by the State over the Amazonian region, and it features what Becker (2007) called the regional planning time. The chain between different aforementioned administrations, despite the different political trends they represent, lies on the ideological concept that sees the Amazon as empty space and, therefore, resistant to State control. From this viewpoint, the several projects developed to this region assumed the need of stopping some supposed threats to the national sovereignty, within the Amazonian space, which was taken as vulnerable location to territorial losses and prone to revolutionary demonstrations (Secreto, 2007).

Promotion of Amazon occupation through domestic and external immigration aimed at groups suitable for national interests; therefore, it became the strategy of different political administrations (Guillen, 1997). Back to Vargas' administration, for example, the so-called "March to the West" program encouraged the economic integration between the Northern and Midwestern regions, and the Southern and Southeastern ones, based on

investments in both roads and programs to attract workers from the Northern region (Secreto, 2007). This program was used to meet the Washington Agreements, according to which, the United States would provide technical resources and support to Brazil, in exchange to essential raw materials during the Second World War, mostly rubber. The government made massive investments to recruit approximately 40 thousand workers to work in the war efforts through rubber trees' exploitation in the Amazon; this is the reason why they were known as "rubber soldiers". Other than guns, these 'soldiers' held machetes to bleed rubber trees in the "Battle of Rubber" (Guillen, 1997).

During the short period-of-time experienced after the Vargas' Era, the Amazonian Development planning was in the hands of Superintendence of Economic Valorization of the Amazon, also known as SPVEA, which was launched in 1953 to coordinate "measures, services, ventures and construction sites destined to boost the development of extractive, agricultural, livestock, mining and industrial production, as well as exchange relationships" (Brasil, 1953, n.p). During Juscelino Kubistchek's administration, Brazil's industrialization targets were linked to intense occupation of the Amazonian region. The launching of BR-14 Road, known as *Belém-Brasília* or *Transbrasiliana*, was one of the main deeds of his office. It effectively met the goal of attracting settlers and of favoring the growth of cities by the road. It also led to an unorganized land occupation and land-grabbing, without actually accounting for any improvement in the lives of migrant populations (Andrade, 2019).

The subsequent military administrations intensified the territorial control policies and broadened infrastructure through Superintendence for the Development of the Amazon, also known as Sudam, which replaced SPVEA, in 1966. Different developmental programs and projects were implemented, among them, the National Integration Program (also known as PIN), which aimed at building BR-230 Road (*Transamazônica*), with its more than 4 thousand kilometers long, which connects the states of Paraíba, Piauí, Maranhão, Pará and Amazonas. PIN also accounted for building the BR-163 Road (*Cuiabá-Santarém*), which crosses the herein assessed region.

The implementation of a series of intervention and space-reordering policies in the Amazon, without the real understanding of both the region and its societies, led to new territorial, cultural, and economic configurations that soon evolved to conflict. Hundreds of thousands of workers, who were attracted by the promise of access to land and of improvement of live conditions, left their original locations and migrated to the Northern region; linking their individual and collected projects to an unknown region (Velho, 1994). Favored by the installed infrastructure, extensive migratory social networks were set. Therefore, the Amazonian population jumped from 1 million to 5 million people between the 1950s and 60s (Becker, 2007).

The large crowd of migrant workers dominated family farming techniques and they practiced vegetal and animal extractive activities. However, agriculture required hard work and resulted in low financial income given the precarious infrastructure for production flow – this issue remains to present days. It was in this very background that artisanal and small-scale gold mining in Tapajós Basin became one of the most significant economic fronts in the state of Pará, in the 1960s and 70s. Based on the indirect influence of State actions, the intensification

of auriferous exploitation led to new ways of life and new ways of use of the Amazonian territory by natives and migrants.

The different projects for the occupation of the Amazonian border can be seen from the perspective of José de Souza Martins (1996), based on the sense of pioneer front and expansion front. The pioneer front is featured by economic rationality, and it has the government as the main entity accounting for it, since the public power would act to set institutional and political relationships aimed at fulfilling the production demands and the profit of the big capital. The expansion front, in its turn, is featured by the settling of several population groups in the territory, among them, migrant workers coming to wildcat mining activities, who carry their own beliefs and values in their bags, and set specific social bonds and mercantile production relationships. Different penetration modes on the borderline coexist and interact in the territory. Oftentimes, they face conflict and exploitation conditions, given the combination of interests associated with both land use and exploitation of natural resources (Martins, 1996).

According to Salomão (1984), the relative distance from the State-power centers and the low degree of *garimpo* activities' regulation has contributed to the emergence of an Amazonian wildcat mining society that developed from the perspective of a hidden social formation, that is substantiated by behavioral rules and ethical principles linked to trust relationships and informality. These elements guided negotiations, work deals and daily life articulations. However, away from the Amazon, the main product of this social formation – the gold – got to the circuit of a secondary globalization in order to meet market demands of the main cities of the world (Knowles, 2014).

3. Brief biography of the wildcat miner known as A.J.C.

A.J.C. was born in the state of Ceará and migrated to state of Pará at late 1950s; he was attracted by the Amazonian occupation policies in place, at that time. Initially, he settled in an agricultural colony, but given the economic impairments he was going through, he moved to Santarém City. As he did not get a job, he left to the wildcat mining zone at the end of the 50s. According to him, the news of gold discovery in the Tapajós basin spread fast through 'gossip", and made many men, like him, become wildcat miners in pursuit of the enrichment dream. About his dream, he told stories of suffering, and challenged the interviewer to find another one who would have suffered more than him:

> *If there is anyone who has suffered as I did, I guess there are only few, because I have suffered alot.*
> *I was born in Ceará, Frecheirinha County. I was raised without a father, suffering, I did not study, I just worked. Nowadays, I am 80 and I never went to school to learn my name. I only learned the name, a person used to come here and there, I learned not to be really illiterate. At the age of 20, I came to Pará. I started working there, in Ceará State, at the age of 10, I had no father, I only had my mother, a widow. I came here to Pará and here I am, still.*
> *I, at the age of 10 ... a rich man in Frecheirinha, a farmer, saw our life working in the crops. I could hardly hold a hoe to work... he asked my mother: "Miss Mary, give me this boy to stay in my office, just to clean a few things to me. I will pay him well". When payday came, in his office, there were many employees, and they saw that he paid me the same salary of an adult man, at the age of 10. I was never a playful child, not at all, I just worked. This man gave me this guarantee, with a salary at the age of 10, and everybody was mad about it. He said: "I am*

paying this child because of his prestige, not every adult person has this child's prestige". He touched my head and said: "Son, be a man, you were raised without your father, be a man in the life you will live ahead. Thank God, for this man's speech, which I could not have had from my father, I went on. He had a sugarcane mill, and produced brown sugar; he made me work in the mill. I stayed. When I turned 20, I came to Pará.

Boy, I came on a vessel; the government was throwing people in these vessels at that time, in 1958, because of the drought. We were thrown here, some stayed in Belém City, others stayed in Santarém City, and others went towards the Amazonas State. They spread all over the place. I stayed here, and still am. I raised my whole family here. I got together with a woman, who already had 7 children. They were raised like they were of my own, they are all adults now. Later, my woman died, and just the family remained, they are all married.

When I first got here, I went to the colonies (rural settlements). I worked hard in the colony, but I thought it would have no future. At that time, there were no roads, there was nothing; I came to town to see if I could provide some education to my kids. I was illiterate and wanted to see if I could at least educate my children. Actually, they all went to school. I came from the colony to town and I saw that there was no job for me to live on, then, I went to the garimpo. Over there, I worked a lot with my bare hands. I never worked on my own; I just worked to other people, to the owners. I worked in several 'garimpos': Crepori, Marupá, Água Preta, Mato Grosso, São José, Porto-Rico. I worked in all these six garimpos. Most of time in the manual, with my bare hands, but in the end, I worked with the right gear, but for a short-while, only. I spent many years struggling. Here I fed 11 people and paid the rent to give them a house. I did it all, to hold on still, Thanks to God. They are all adults; they are all on their own now. Today I live alone, with God.

The work at the garimpo was very hard. I was good for a week, and in the second week, I had malaria. That is the way it was. Sometimes, I was in the ravine, I had malaria in there, but I could not get out. The ones who were feeling good used to take me out of there, and to take me back to the shack. It was a struggle. It was quite heavy. But it was there in the garimpo, where I went to get some money to buy a tent in Santarém. Nowadays, I still have my tent.

The handwork was made with the aid of a hoe, in the 'peola'[1], pickaxe, pan, bowl. We marked a square in the ravine and started digging. I was tired when it was time to leave the ravine, because water used to gush. Whenever I went into the ravine, I was very small, and water was up to my neck, I had to take out the water using only a can. There were days when I spent the whole day taking out the water from the ravine; it was almost night when I went to work a little digging somewhere else. It was very hard.

We used to go to take the things in the village ('corrutela'), put everything in the bag ('jamanxim'), when up the hill for two or three hours to get to the place where we were working, that's how it was, things weren't easy, at all. When the guy asked: "So, A., is this 'garimpo' thing good?" I would say: "Boy, it is for a kind of crazy people, who do not fear dying at any moment, because we die with illnesses in there, die with a bullet, we die through many ways. If you work well, you live well, but if you are a queasy guy, you end up buried in there". I, thank God, made many friends. I worked in there for 12 years, in the 'garimpo'. It was where I could to make some money, I got my properties in there, then, I came back, and then I spent some time working in the city. But everything started in the 'garimpos'.

I ended up in the 'corrutela' of São José's garimpo, in Pacu. It was in this mine that I stopped walking around the woods. I bought a place there, right in the garimpo, I built a house, opened a restaurant and a bar. That is how I ended up in the 'corrutela'. When I worked, I stayed in my shack. The little gold I got was sent to Santarém. I never spent my money with

[1] Equipment in a form of hoe, but with a smaller metallic area used by wildcat miners to take clay out of the shacks. They don't use conventional hoe because of the weight of the alloy in the instrument that, because it has a large metallic area, covers the largest volume of material and impairs the proper excavation movement to take off the waste; this factor can cause injuries in workers' back.

foolish things. I could not spend it, anyways. Miners would get to me and say: "Fuck, T., you just want to be 'colonheiro', you do not want to be a miner. I do not see you with a golden bracelet, or necklace, or nothing, what is this, man?" I would say: Boy, mine is not enough. My expenses are high. I am taking care of my family. If had not, I could have bought whatever I wanted to, but I did not spend what was mine, for nothing, no way. I spent it with my family.

Many people died this way, who did not care for life. They thought the world was theirs. They thought: "I get three, four kilos, and spend it, and a get some more". But it does not happen this way. It vanishes; where is it? I was not lucky, because I worked for other people. I would get some land, I would go to work, then I had to give half of the gold to the landlord and the other half was mine; and, at that time, it was very difficult, because it regarded hand work, it would take one, two months, just to cover a tiny land plot. Things were not easy at all.

Some people say that gold is cursed, but it is not, it is not cursed, at all. Cursed is the person who does not know how to spend what they yearn. I was tired of seeing people saying that these 'arigós' come to Pará with nothing and, nowadays, they have a little, and this is because they are cocky and miserable. That is not it. It is so, because nobody likes to get one hundred Reais and spend it all. Spend only fifty, even if it is not good enough, but save fifty. One day, the situation will get better, such as those who did not have anything and nowadays they are business persons.

I do not have it, because my day by day was always heavy. It is not easy, the guy spent the whole day, had malaria today, day and night with malaria, and, in the following day, I would go to work, shaking. I could hardly hold the hoe with the land to throw away. So, for the person to handle it, it had to play like a man, otherwise, it would leave the 'garimpo', pretty fast.

If there is a man who has suffered more than me in this world of living people, if there is one who has suffered like me, I think there are only few, because I have suffered a lot. I am still living because I do not give up, at all. I have not been working for three years, now; I am willing to, but then, I spread up to one side and to another, I go to Alenquer, to the colonies, to Manaus, and beyond. I have not been making a penny for three years already. My old lady died, was buried and did not take anything with her. I am at the end of my journey, myself, and I will no longer work. Whenever I die, it is over. I have worked a lot, but if I have to work again, I will (A. J. C., Ago.2017).

A.J.C.'s speech well introduces the expectations coming along the migratory flow from the Northern region to the Amazon, and the joining of these expectations in the wildcat mining camps of Tapajós basin, after workers realized that work in the colonies – in the rural areas - was too hard and did not worth the effort. It also shows some sense of masculinity associated with hard work and the courage of a *kind of crazy people, who do not fear dying,* as well as the dangers faced at the mine, where one dies of *illnesses, bullet, or of any other ways*. His testimony also predicts technical changes observed in mining procedures – from handwork to semi-mechanical work – that, despite demanding new skills from miners, also imply changes in labor relationships and in the pecuniary division regime in wildcat mining camps.

4. Manual and semi-mechanical wildcat mining

Over the whole 1960s, up to early 70s, when large machines started being adopted, the prevailing gold exploitation model in the Amazon lied on handwork. It substantially fitted the typification of artisanal and small-scale mining (ASSM, known as '*garimpagem',* in Portuguese) given by the Mining Code of 1967:

> […] individual work performed by those who use

> rudimentary tools, manual devices or simple and portable machines, to extract gemstones, semi-precious gemstones and metallic or non-metallic minerals, valuable, in eluvium or alluvium deposits, in channels of watercourses or on reserved banks, as well as in secondary deposits or plateaus (*grupiaras*), slopes and ravines; these deposits are generically called *garimpos* (Brasil, 1967, n.p).

In comparison to the semi-mechanized model, the handwork used to give more autonomy to wildcat miners when it comes to the set of stages comprising the production process, allowed them to perform their activity as owners of their production means and of their own work. They demanded low investments and had a lot of raw material available in the forest to make the tools used in mining processing.

The manual mining process started at the exploration stage, which consisted in an expedition of experienced wildcat miners to the forest in order to find areas with rich soil in gold; aiming at opening mining terrains. With the aid of hoes, they would open paths and trails in the closed forest, and they would use them to look for creeks located in slopped sites, called '*baixões*' (low lands). Then, wildcat miners would extract gold in these areas, as explained by former miner P.A.:

> *Explorations worked like this. You would get into the forest and search for gold. The ones who walk testing gold. Each collection made, you would keep to show to the owner. Whenever you would find some, you would show to him. Whenever we would find a new 'baixão', we would make a mark in it. We would peel a tree stem and make a mark on it. It was like iron, to say that it already had an owner. The owner would ask: "where do you think there is more gold?". In this one. "Then, you will take a group to explore it". We would take the people and they would start working. Ready! From this point on, it was no longer our business, it was his. He would have to find the means from that point on, and we would go exploring somewhere else. That was our life. We would spend more than 90 days in the woods, exploring* (P. A., August 2018).

Explorers would get in the forest with guns, ammunition, flour, salt, salted meat and tools, such as hoes, *peola*, bowl and pans, all them inside their 'jamanxin' – kind of backpack made of liana (known as *cipó-titica*), which is a clear, resistant and flexible long fiber that is quite abundant in the Amazon. Based on their own experience, whenever explorers found a good place to find gold, they would open a trail and a hole (2m x 2m, on average) to collect gravel samples. The amount of powdered gold found in the collected material would determine the opening, or not, of a workstation or ravine[2]. In order to illustrate the high level of analytical skills and expertise required to detect an environment appropriate for gold exploitation, former miner J.L. mentions that 'gold powder' *is the size of a mosquito eye*.

Once an area where one assumes to hold ore[3] is detected, the ravine excavation process starts; where up to three workers often work on it. First, they would plot the lots of 5m x 5m or 10m x 10m, approximately, that were measured with liana, taken from the forest. After the terrain was measured, they would take the "seal coat" - a surface soil layer where one could find several debris, such as wood,

[2] Workstation or ravine is the place where workers perform their mining activity.

[3] If the area was considered too rich, it would quickly become gossip, and a significant number of wildcat miners would be attracted to the location.

rocks and roots. This task was often carried out by workers called "madmen", who were the little experienced ones.

Subsequently, the ravine was excavated with a tool called '*peola'*, which resembles a hoe and works specifically to remove clay. In the words of former miner J., himself, *it is a small mining hoe. It is appropriate for us to shuffle the clay out. It holds the perfect amount, not more, not less.* The '*peola'* was stuck in the ground to remove the clay, layer by layer, until reaching the limit depth this tool was capable of reaching. Another former wildcat miner, C.M., warns that, at this stage of the work, one cannot make mistakes, because it is necessary making sure that the whole clay in the '*peola*' will be ruled out, or they can develop back injuries: *I have seen many men get stuck in the ravine with their backs ripped off.*

Ravine excavation takes from three days to four weeks[4], depending on gravel depth, which is the layer where gold is often found. *Right there, where it is stuck to a gum, an earth, there is where gold is in, inside these rocks. It is why it is called gravel, because it is gold gravel.* Former miner J. identifies the gravel when the appearance of the excavated soil changes and discloses an earth layer with rocks, *kind of who makes a pebble floor,* as people use to say. After all the clay is removed, only the gravel layer remains, and it must be removed until you find the '*lagreza'* – a smooth clay layer that looks like mud. According to J., *it is quite smooth. Smooth, smooth, smooth. It sinks right there, when you reach the lagreza[5], there is no more gold underneath. That gold goes up to the 'lagreza'* (J., Feb. 2016).

Gravel is heaped after it is removed to be processed in the '*lontona*' (or carpeted sluice box), which is an artisanal piece made of forest wood by the wildcat miners, themselves.

'Lontona' is a kind of door, but it is bigger than a door, it is three times longer than a door, then we put a wooden board on the side, very low, 10cm from the basis. It is sealed, because it cannot let water out, at all, otherwise gold runs off. We seal it with a hose, we burn it and put in into the board's gaps. When it is over, you put the chaff, and then, a 2m carpet, close to the place where the gravel spout will fall. The carpet must be the width of the plank. Small splints are placed in the box so that the water with gravel goes down a cascade, because there are a lot of quicksilver there. Approximately 200g of quicksilver to catch the gold, when we heat it. The quicksilver is used to hold the gold (J. L., Oct. 2017).

After the process in the carpeted sluice box, it is the time of unpicking, when the gold stuck to the carpet or to the chaff is removed. These objects are washed in powdered soap, in buckets, in oil tanks, animal wooden feeders or water tanks. Gold mixed to quicksilver (common name given to mercury) and to clay falls inside these containers, which are taken to places close to wells or creeks for the material to be hit. Essential instruments used at this work stage are pan (zinc-made conic instrument[6]) and

[4] Factors such as rainfall or floods in the ravine due to infiltration lead to work overload, because it is necessary to go on with their task by removing all the accumulated water with buckets.

[5] Soil layer where miners have identified, due to texture, lack of gold. This is the information about the limit for ravine excavation.

[6] Actually, both instruments are used from gold prospection to refinement among mud and clay debris; the pan processes smaller amounts of material, it is more often used for sampling prospection. The bowl, in its turn, according to Cleary (1992), has been used since the 18th century, when it was made of wood.

bowl (steel-made object shaped as the fruit of tree belonging to species *Crescentia cujete).* The bowl is more often used to test rock samples and smaller portions of the gold/clay mix. However, both instruments are adopted to wash and remove waste from the collected material, but in a very careful way, because tiny gold particles can run off the bowl if the miner is not an expert in the movement to be performed. Only gold amalgamating with quicksilver must remain after the final check in the ore.

The final stage regards the burning. The material (gold and quicksilver) is placed in the bowl and burnt with the aid of torch or gas cylinder to achieve mercury evaporation. Then, the effectively checked gold would be divided between the workers. The sharing was oftentimes made, in an egalitarian way, among workers, at times of handwork, or, yet, when the ravine had an owner, he would get 10% of the total production. The "half square" practice was also observed. According to it, the landowner would pay for the expenses and get half of the gold.

Back in the 1970s, given gold valorization in the international market, the use of engines in small-scale mining got more intense after they were introduced to the Brazilian workers via technical assistance provided by the National Department of Mineral production (also known as DNPM). The machines were widely used in wildcat mining since the 1930s in the U.S., but their costs could only be absorbed in the Amazon after the capital accumulation generated by high gold prices in the external market (Cleary, 1992).

On the other hand, the introduction of motorized machinery provided a more professional profile to small-scale mining, and it reinforced the social division of labor and the duality between those owing the production means and manpower. The created semi-mechanized gold exploitation model could be divided into, at least, two ways: extraction in low lands and in ravines, and exploration through mining rafts, on riverbeds. Thus, both the ravine and the raft modalities had an owner who would invest a high capital, and men who would work to such an investor. After these systems were introduced, they demanded the creation of specific functions based on machine operators' technical skills. Moreover, the sharing of the extracted ore was then based on limits ranging from 10% to 30% to the owner, and the remaining fraction would be shared by workers.

The structural change in processes and in labor relationships seems to have been easily embodied by wildcat miners who were in charge of the handwork. Based on their speeches, they highlight that the handwork was painful, very heavy, and that the machines allowed working in larger sites in a shorter period-of-time; in other words, it allowed higher production and gains, even if the share belonging to the 'boss' was less favorable for workers.

Ravines' semi-mechanized exploitation demanded a team with four to six individuals for each 'pair of machines': a jet pump[7] and a suction pump with '*maraca*' nozzle[8], which are powerful machines that consume a lot of diesel per hour. The jet pump cuts the clay with water pressure and the suction pump sucks the earth from the '*lontona'*.

[7] High-pressure hydraulic pump used by miners to disassemble the ravine's wall and guide the material mixed with gold to the 'maraca' well in order to get sucked by the sluice chute.

[8] Maraca nozzle is a stainless steel part installed in the gold sucking hose. This equipment works to avoid pipe clogging.

The jet pump is operated by the jet-operator, who is the expert in its handling; the suction pump, in its turn, is operated by the '*maraca-man'*. Former wildcat miner, J., mentioned that, if the operator did not handle the suction pump with expertise, it would clog and break, because of the rocks, wood pieces and of a whole series of ravine debris going through it. Thus, two root-men also worked in the ravine; they used to be 'madman' miners in charge of picking wood ticks and rocks capable of damaging the 'maraca'[9].

Mining based on the raft model or diving modalities was pioneer in the Tapajós region; later on, it expanded to other river regions, mainly Crepori and Tocantins, at mid-1970s (Cleary, 1992). This production mode was only possible after the introduction of engines in the work process, because they helped removing the gold found in alluvial deposits on riverbeds. The raft would anchor close to the river side and the miner would dive, tight to a steel cable, wearing a vest with lead bars (10kg to 30 kg), 4 to 8m deep, approximately 12m from the ship. After the submersion, this 'maraca' operator would operate the pump to suck the gravel to be washed in the carpeted sluice box, which would be on the raft. The procedure performed to get the gold and to refine it was identical to that adopted in the ravines, except for '*curimã*', the waste exploration discharged directly into the river.

The work in the rafts was performed by two teams that would switch 6-h work shifts, and it totaled 12-h shifts a day. Each team comprised two diver miners and one more regular miner, who was in charge of monitoring the machines to send oxygen to them and to control engine power to disassemble the gravel. Each diver would be submerged for three to four hours, and used a code (based on pulling a steel cable) to communicate with the controller on the raft. At the time to get out of the water, for example, the miner would shake the cable in order to be dragged by the winch to the surface, just as an *exhumed deceased,* in the very words of former diver C.M.

The wildcat miners acknowledge the raft work modality as the most dangerous one. There are several recorded reports of divers who have died on landslides in the ravines, due to bad vision under the water, in the river. According to them, the miner loses its sense of depth and keeps on going deep in the hole made by the '*maraca*'; there are times when the ravine walls collapse on the worker. Furthermore, the fact that they stay under the water for long periods-of-time compromised their health within few years of work. Yet, there was no control over the quality of the used gear, which, every once in a while, put the diver under imminent risk of death. Other threats were murdering inside the river by miners who fight for new zones rich in ore, mainly in areas that are in the mainstream of "gossip".

5. Environmental policies and the trajectory of wildcat mining in the Tapajós' region

The technical changes that took place in wildcat gold mining camps from the 1970s onwards broadened the ore extraction capabilities and, consequently, its impacts on the environment. The mechanical pumps affected extensive areas of

[9] According to J., a team with more than 6 workers would lead to low incomes for all, because the fraction given to them was equally shared among them, regardless of being more or lesser experienced workers.

forest and destroyed streams and headwaters, producing millions of cubic meters of waste removed from the ravines. The rafts, in their turn, polluted the rivers, because they remove the riverbeds and take the discharged mud back to the water; it leads to siltation and changes the rivers' entire current system and depth[10].

Another serious environmental issue resulting from wildcat mining lies on the large volume of mercury (Hg) discharged into the nature. Artisanal and small-scale mining is the main activity accounting for mercury use worldwide (Esdaile; Chalker, 2018) and for depositing approximately 100 tons/year of this metal into the Amazon Rain Forest (SÁ et al., 2006). Mercury is discharged, along with the mining waste accumulated in the soil, in the streams and rivers, in fishes and in other aquatic food supplies; and it broadens damages and affects the food security of populations living close to mining regions. Moreover, most of the time, mercury handling is performed without individual protection equipment, and it can cause neurological and kidney diseases both in workers and in people who live close to the wildcat mining zones (Esdaile & Chalker, 2018).

However, for more than 20 years, the small-scale gold mining developed freely in Tapajós basin, without filters to avoid environmental destruction. From the mid-1970s, onwards, global changes affected the relationship among State, economy and society; it reorganized values, territories and vision of natural media as essential for mankind's survival on the planet (Casttels, 2008). The environmental agenda became topic of international discussion[11], and Brazil, by holding biomes with large biodiversity, mainly in the Amazon, which is the largest tropical forest of the world, was brought to international spotlights that shine over environmental protection.

It is worth highlighting that the state management model applied to the Amazonian territory between the 1930s and 80s was guided by natural resources exploitation policies as economic-growth way, without too much concern with impacts on the environment (Ferreira; Salles, 2017). Extensive mining was part of this political orientation and it was encouraged by the government in order to get it well structured. In its turn, small-scale mining (*garimpagem*) was outside this economic policy; it was far from the State and supported by informal relationships.

Nevertheless, in 1979, artisanal gold exploitation got to compete with industrial production and to promote the most significant gold rush in Brazilian history; it mobilized workers from all regions in the country (Cleary, 1992). Although there are no accurate numbers, because there was no effective data monitoring in the sector, Cleary, (1992) and Mathis *et al.* (1997) estimated that there were 200-300 thousand workers mining in the wildcat mining camps herein assessed region, at that time.

Changes in the world's attitude towards the environment and the growing international pressure, as well as the intense domestic demands by social movements, civil society and non-governmental organizations made the Brazilian government adopt integrated environmental protection policies, from

[10] More recently, the backhoes boosted deforestation in the Amazon.

[11] The United Nations Conference on the Environment, carried out in 1972, in Stockholm, Sweden, is a milestone in the debate about the use of natural resources, which has triggered the proposition of reformulating the economic models based on intense environment exploration and on international sustainability agreements aimed at the planet's conservation for future generations and at environmental impacts' reduction.

1980s, onwards. This change in environmental policy orientation, as well as changes in society values regarding the environment, had straight influence on small-scale mining production relations in the Amazon.

ASSM and wildcat miners became anachronistic in the country's modernizing project. Wildcat mining camps were constantly in the media's mainstream as threat to traditional lifestyles in the Amazon, where one witnessed lack of legal regulations, place of high violence rates, environmental conflicts, rivers' pollution, fish contamination with mercury, ineffective technology, labor exploration and prostitution (Tedesco, 2013). These negative elements became the factors defining the social imaginary about wildcat gold mining camps (*garimpos*) and their miners (*garimpeiros*) (Barbosa, 1991).

Consequently, small-scale mining regulations were updated based on the issuing of decrees, ordinances and specific laws aimed at aligning the sector to modern concepts of environmental policies. ASSM gained a differentiated statute in the 1988 Constitution, based on regulation and control by the State – the right to explore mineral deposits was granted to natural persons, mainly through cooperatives. It was done in order to ensure wildcat miners with environmental protection, and social and economic integrity[12] (Brasil, 1988).

In order to match ASSM to the Constitution, Law of Small-scale Mining Regimen (*Lei do Regime de Lavra Garimpeira*) was enacted in 1989. This new rule extinguished the wildcat miner's enrollment registration regime, and implemented the Small-scale Mining Permission (*Permissão de Lavra Garimpeira* - PLG). As for the effects of law, the PLG regime dealt with "the immediate use of mining in mineral zones that, given their nature, dimension, location and economic use, can be explored regardless of previous research. However, it would depend on prior environmental licensing granted by the environmental bureau in charge" (Brasil, 1989, n.p). The new legal framework put aside the concept of tradition and roughness, which was historically linked to ASSM. This activity was now defined according to parameters focused on ore localization in the soil and on ore types capable of being mined (Brasil, 2020).

Briefly, small-scale mining was addressed in several legal devices aimed at controlling mining zones' production and release, as well as at workers and the environmental protection. However, the ineffectiveness of the developed control mechanisms created an abyss between the legislation and the practice developed in wildcat mining zones both in the Tapajós and in the Amazon. Sousa *et al*. (2011) assessed small-scale mining regulation in Brazil, and they have highlighted that 99% of miners in the herein assessed region worked under illegal procedures. These authors also pointed out several historical issues that impair such mining modality to thrive and to reach the legal stage, as well as to develop as economic sector, namely: regulations that do not match the reality of wildcat mining zones and its miners in the region; no political will by the State to provide technical support and technological innovation to wildcat miners; precarious

[12] Art. 174, § 3, reinforced the mining activity in an associative way, it is concerned with miners' economic and social promotion, and with environmental protection. Encouragement to cooperatives was mentioned in §4 of the same article: […] cooperatives referred to in the previous paragraph will have priority in research authorization and granting, as well as provides on mining resources and deposits in the zones where they work, and in zones set according to art.21, XXV, in the form of law (Brasil, 1988).

infrastructure provided by the bureaus in charge of inspecting and controlling production; and lack of encouragement, and conditions for miners to get to fulfill the legal requirements.

These factors put the small-scale mining economic sector under a paradoxical condition. On the one hand, this sector mobilizes hundreds of thousands of workers who extract tons of gold on a yearly basis, who move millions of Reais, and who contribute to an important fraction of the GDP in several Amazonian municipalities; this sector is also interconnected to a complex production chain that is bond to local and global fashion and luxury markets, and to active financial investments in stock Exchange (Kuramoto, 2012). On the other hand, this sector is linked to informality and illegality, given the ineffectiveness of small-scale mining control and regulation control policies.

6. Final considerations

The development of an economic small-scale mining front in the Tapajós basin was boosted by the discovery of gold deposits in Southeastern Pará State, but also by geopolitical actions aimed at the Amazonian integration and occupation practice by Getúlio Vargas (1930 - 1945) and Juscelino Kubistchek's (1956 - 1961) administrations; moreover, these practices were broadly amplified during the military regime in Brazil (1964 - 1985). These actions produced new frontiers and encouraged long-term migration movements to the region.

The large crowd of workers coming from the main states in Northern Brazil migrated based on the promise that the Amazon would provide rich and fertile lands, and that they only had to be willing to work in order to leave poverty and reach better life conditions. The developmental policy adopted by the Brazilian State did not ensure the real conditions to the socioeconomic development of the migrant population. These people found opportunities in several economic fronts that rose in the region, such as rubber and cocoa extractive activities, wild animal fur trade, agriculture and, at late 1950s, gold mining. Thus, the mining activity was broadly required by these workers; actually, from the 1970s, onwards, mining became the very reason for migration, since it worked as front to mainly attract residents from the Northeastern region.

It is essential highlighting that the life trajectory of most migrants sent to occupy the Amazon is marked by privation episodes. Those are individuals who share besides the Northeastern origin, poverty, illiteracy and formation in crop working since childhood. Accordingly, the small-scale mining social structure rose as field of real possibility for the project aimed at life enrichment and at changing the lives of these men and women.

These elements are dealt with in the biographic report by former miner A.J.C., who had no schooling and faced the early loss of his father, and who had to work since childhood to help his family income. At young age, back on 1958, he moved from Ceará State to Pará State; he was attracted by the State-propaganda of rich and fertile land for those who were willing to migrate. Santarém City witnessed a different scenario from the promised one. A.J. worked in agriculture and faced a hard time due to precarious conditions for production development and flow. Due to low income, he could not keep his large family, with 11 children. When he heard the "gossip" about prosperity in wildcat mining camps and stories about people who sank in gold, he ma-

de the decision to become a wildcat miner. A.J.C. started his journey in artisanal mining at the early stages of modern small-scale mining in the Amazon. He worked mainly on the handwork model. He explains his suffering and the hard time working as miner, in details. His report shows the transition from manual mining to the semi-mechanized one, due to the implementation of jet and suction pumps, and how this technological change influenced the gold production model, its economic organization and small-scale mining labor relationships.

Based on the reports by A.J.C. and by other former wildcat miners, it is possible identifying how the sense and practices of natural resources' exploitation was developed. The testimony by A.J.C. expresses miners' daily extensive consumption routines in bars; how they used to spend large amounts of money with prostitutes and alcoholic beverage. As he had said, they were not concerned with saving money, and conspicuous consumption became the very mark of these miners. A.J.C, himself, was criticized by his peers because he did not behave like a wildcat miner, he did not spend too much money, he did not have gold bracelets, necklaces or teeth. These behaviors were based on the understanding that gold is easy, endless and available at any time, only depending on luck and on how hard a miner works. From this perspective, former wildcat miner P.A. explains that "*if the wildcat miner finds gold anywhere, in the mountain, in the river or in the ravine, he does what has to be done, no matter the effort, he will take that gold out"*.

These consumption practices, gold exploitation based on large waste and mercury volume, both discarded into the nature, the perception of natural resource as endless and low socioeconomic development rates in wildcat mining zones, faced the new social order imposed from the 1970s, onwards. This new order focused on environmental preservation and addressed changes based on acknowledging that natural resources are finite and essential for humanity's permanence on the planet.

The new paradigm reoriented the attitude of nations towards the environment. Different states developed policies and significant legal apparatus aimed at protecting nature. The small-scale production model and social practices within this process became anachronistic to the Brazilian developmental project. A set of legal standards, entities and public bureaus was created in the country to preserve the environment and to impose control over activities that can have strong impact on it.

New configurations were posed to the wildcat mining exploitation model after its acknowledgement in the 1988 Constitution. It is worth highlighting that the activity's regulation through Law of Small-scale Mining Regimen, from 1989, enforced the Small-scale Mining Permission regimen for small-scale mining. Among other provisions, this law impairs the small-scale mining activity, the dimension of the zone eligible for exploitation, and typified mining ores, besides imposing the granted one (mainly that set in associations) the mandatory evaluation of environmental impact caused by the mining activity to the environment.

Briefly, the assessment of the regulation process gives wildcat miners a series of requirements to fulfill the legal devices and technical studies that demanded high financial resources and long periods-of-time. With respect to wildcat miners in the Tapajós basin, whose profile is herein reported through the speech by A.J.C., these requirements were almost unreachable. Thus, approximately 99% of wildcat mining zones in the herein assessed

region remain under informal and clandestine condition, far from technical and legal control by the State (Sousa *et al*., 2011). In other words, the law, instead of starting from the reality in wildcat mining camps to set the safest conditions for small-scale mining, from the environmental and professional viewpoint, it worsened the illegality condition of mining workers.

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