

## COMMENTARY

# Brazilian Amazon gold: indigenous land rights under risk

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Indigenous lands protect 23% of the Brazilian Amazon, covering more than 100 million hectares, and area the size of Colombia (Walker et al., 2020). Maintaining the integrity of these lands is crucial to contain deforestation, maintain the stability of the regional climate, mitigate global climate change, and protect indigenous rights (Soares et al., 2010; Nolte et al., 2013; Walker et al., 2020). Indigenous land rights in the Amazon, however, are at important risk. Their large territories are believed to contain vast unexplored mineral deposits, and nearly one-third of them are areas of registered interest for mining (Ferreira et al., 2014). Amazon forests have historically hosted a variety of mining activities, from small-scale artisanal gold-mining to large-scale operations such as the Carajás Iron Ore Complex. Around 60% of mining concessions in Brazil are in the Amazon region. These have led to extensive deforestation (Sonter et al., 2017) and are usually associated with infrastructure investments such as dams and roads (Tófoli et al., 2017). Moreover, the region is affected to a considerable extent by illegal small-scale gold-mining activity (Cremers et al., 2013; Lobo et al., 2016; Lobo et al., 2018) that is a source of violence (Hoefle 2006) and a threat to the health of local communities (Vega et al., 2018). Indigenous lands have frequently reported illegal mining (Plummer, 2015). Despite this, indigenous lands are largely unexplored in relation to other protected areas (Villén-Pérez et al., 2018) thanks to the fact that legal mining activities are not yet regulated in these territories. However, in February 2020, the Brazilian government signed a bill to open up indigenous lands to mining and other activities (Bill PL191/2020; Agencia Brasil, 2020). Opening for mining activities will presumably boost an avalanche of new exploration requests that will join the hundreds already registered by the National Mining Agency in these territories (<http://sigmine.dnpm.gov.br/>; Villén-Pérez et al., 2018), having an incalculable impact on indigenous peoples and the environment.

The exploration of natural resources on indigenous lands was already a point of contention during the drafting

of the Brazilian Constitution in 1988 (Keppi, 2013). Ultimately mining was permitted in these territories on the condition that the National Congress approved a regulating law (art. 176 and 231). The first regulating attempt (bill PL1610/1996) was proposed a few years later by the conservative pro-development wing of the parliament. The bill was opposed by environmentalist and indigenist representatives, and the debate resulted in a long-standing policy battle in the Brazilian Congress that lasted for more than 20 years (<https://www.camara.leg.br/>; Rolla & Ricardo, 2013). This long-lasting opposition to the bill seems to have been sustained by a political context favorable to the expansion of protected areas – including indigenous land demarcation – as a strategy to contain the high rates of deforestation occurring in the region (Nepstad et al., 2006; Soares-Filho et al., 2010; Nepstad et al., 2014). Notwithstanding, this battle illustrates how Brazilian society and its leaders are sharply divided between development and environmentalism (Zhouri, 2010).

In 2020, the old controversial bill gave way to PL191/2020, which would not only allow for mining but also the construction of hydroelectric dams in indigenous lands. During the last electoral campaign, the current president of Brazil, Jair Bolsonaro, promised that he would open up the Amazon for the exploitation of its natural resources. His agenda was to weaken the environmental legislation that guaranteed the Brazilian Amazon's protection over the last few decades (Abessa et al., 2019; Artaxo, 2019), with a particular focus on indigenous lands under the argument that "it is too much land for so few people" (Reuters, 2019). The far-right president has already weakened and cut funds from government agencies responsible for environmental oversight (IBAMA) and indigenous affairs (FUNAI; Raftopoulos and Morley, 2020). Moreover, Bolsonaro's discourse has encouraged the illegal invasion of indigenous lands and resulted in an increase in deforestation rates during his first year in office (INPE, 2019; Ferrante and Fearnside, 2019). Some indigenous groups, such as the Kayapó, have historically allowed illegal activities in their territories. However, these concessions were selective and made in exchange for cash, which was partially used to control further invasions of their lands (Schwartzman and Zimmerman, 2005). The scenario encountered by indigenous peoples if the new bill were passed would be completely different. The Constitution states that the indigenous communities affected by

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mining operations must receive part of the derived economic benefits (art. 231). However, these may contribute little to indigenous economic development (Lima et al., 2020) and will hardly compensate for the unavoidable socio-environmental impact (Keppi, 2013). First, compensation should go beyond monetary payment. Also, it would be critical to aid communities in improving their capacity to manage the financial resources received and to implement an appropriate benefit-sharing system based on their criteria (Nery et al., 2013). Finally, it would be essential to establish the necessary mechanisms to guarantee that the decision made by the indigenous community on mining in their lands is respected (a right stated by the Constitution, art. 231).

Permitting exploration of mineral resources on indigenous lands will result in substantial degradation of the environment. Mining is already responsible for roughly 10% of Amazon deforestation, considering its effects both within mining concession areas and beyond mining operational boundaries (Sonter et al., 2017). Within concession areas, the forest is cleared to open space both for surface mineral operations themselves and for the storage of mining by-products in tailing dams (Alvarez-Berrios and Aide, 2015; Sonter et al., 2014). Supporters of mining operations argue that the environmental impact of the activity is not that large because operational areas are relatively small compared with large preserved areas in the Amazon. However, mining activities in the region drive significant forest loss extending up to 70 km away from mining boundaries (Sonter et al., 2017). Transportation infrastructure is developed in surrounding areas for the carriage of products and workers, urban areas expand to accommodate the incoming migrant workforce, and forest plantations are established to supply charcoal needs for mineral processing (Sonter et al., 2014b). Among those land-use changes, the construction of roads in remote areas of the Amazon is especially critical because it opens up the forest for further settlement and deforestation (Barber et al., 2014). Further Amazon deforestation may result in regional and global climate change characterized by extended droughts that could entail significant social and economic consequences at national and international levels (Costa and Pires, 2010; Medvigy et al., 2013; Nazareno and Laurance, 2015; Staal et al., 2020).

Mining activities also threaten indigenous society and health. The massive migration of mining employees to a region might cause social disruption in indigenous communities by affecting traditions, depleting local water supplies, or reducing fishing and hunting resources on which local communities are dependant (Hilson, 2002). Moreover, rapid demographic growth associated with illegal mining in the Amazon has historically increased violence and prostitution (Carneiro and de Souza, 2009). As a consequence, the establishment of mining operations within or near indigenous lands has resulted in confrontations between miners and tribes (Carneiro and de Souza, 2009; Haslam and Tanimoune, 2016). Furthermore, the health of indigenous peoples is compromised by chemical pollution associated with different mining procedures. For instance, cyanide and mercury

are used to extract gold from ore and then released to the environment, affecting animal and plant species and accumulating throughout trophic chains and food supplies (Eisler and Wiemeyer, 2004; Esdaile and Chalker, 2018). After four decades of intensive gold mining in the basin, Amazonian peoples are among the most exposed to mercury in the world and report consequential neurological and cytogenetic damage (Passos and Mergler, 2008). Accidental spills add to this sustained pollution. Indeed, Brazil recently suffered two tailing dam collapses with serious ecological and socioeconomic consequences in the regions, rivers, and seas affected by toxic sediment (Escobar, 2015; Cionek et al., 2019). These have been considered the worst environmental disasters in the history of the country and have raised societal awareness on the environmental and human health risks imposed by mining operations (El Bizri et al., 2016). The same companies responsible for these accidents would be involved in the construction of a new tailing dam in the Amazon if a Canadian company receives permission to build the largest open-pit gold mine seen in Brazil to date. The environmental impact assessment of this mega-project recognizes that there is a certain risk of dam collapse, which would have unforeseen consequences, including impact to near-by indigenous communities (RIMA, 2012; Tófoli et al., 2017). Nonetheless, despite adverse technical reports, the licensing process of this and other controversial projects could be expedited with the support of the new pro-development president (Lorinc, 2019).

Indigenous lands are very effective against the deforestation of the Amazon rainforest (Nolte et al., 2013; Walker et al., 2020). If its protection status is downgraded, indigenous peoples will be imperiled along with regional and global climate and economies (Soares-Filho et al., 2010; Coe et al., 2017; Walker et al., 2020). Last year, more than 4000 indigenous leaders of 305 different tribes demonstrated in Brasilia for their land, cultural, and health rights (ATL, 2019). They claimed that the government is neglecting their territories' natural assets and their survival in favor of agribusiness and mining interests. Meanwhile, more than 600 European scientists appealed to the EU to impose strict social and environmental conditions in their trade negotiations with Brazil, highlighting the co-responsibility of developed countries for Brazilian deforestation (Kehoe et al., 2019). Recently, the Articulation of Indigenous Peoples of Brazil (APIB) expressed its emphatic refusal of the bill proposed by the government to regulate mining and hydroelectric projects on their lands. Even though they are faced with the challenge of sustainable economic development (Le Tourneau, 2015), they are not willing to allow the enrichment of others by exploiting their natural resources. Bolsonaro's policies are promoting the ecocide of the Amazon and, if implemented, will have a devastating impact on the region and its traditional inhabitants (Raftopoulos and Morley, 2020). Thus, we add to national and international calls to urge Brazil's federal administration not to yield to mining companies' interests and to recognize the social and ecological value of indigenous lands.

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## Competing interests

The authors have no competing interests to declare.

## Author contributions

Contributed to conception and design: SV-P; Drafted and/or revised the article: SV-P, PM, PDM; Approved the submitted version for publication: SV-P, PM, CCN, PDM.

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