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JOÃO LAET/GUARDIAN/EYEVINE

Illegal mining operations in Brazil, such as the one shown here in the Yanomami Indigenous reserve, destroy the rainforest.

ILLEGAL MINING IN THE AMAZON HITS RECORD HIGH AMID INDIGENOUS PROTESTS

Satellite data confirm incursions on protected lands as Indigenous people fight for their rights – and recognition of their role in conserving forests.

By Jeff Tollefson

Indigenous territories, long a bulwark against deforestation in the Amazon, are under increasing threat in Brazil, according to an analysis of 36 years' worth of satellite imagery. The data show that illicit mining operations on Indigenous lands and in other areas formally protected by law have hit a record high in the past few years, under the administration of President Jair Bolsonaro. This underscores fears that his policies and rhetoric are undermining both human rights and environmental protection across the

world's largest rainforest. Mining operations strip the land of vegetation and pollute waterways with mercury.

The analysis, released in late August (see go.nature.com/3zvtjyz), comes as scientists and environmentalists warn of a deteriorating situation in Brazil. Indigenous groups have frequently found themselves in violent clashes with miners since Bolsonaro took office in 2019 – and they are demanding more protection for their lands. Although Indigenous territories are legally protected, Bolsonaro has openly called for mining and other development in them.

"This is definitely the worst it's been for

Indigenous peoples since the constitution was signed in 1988," says Glenn Shepard, an anthropologist at the Emílio Goeldi Museum in Belém, Brazil. Before this, the country was ruled by a military dictatorship.

Researchers at MapBiomias, a consortium of academic, business and non-governmental organizations that has been conducting geospatial studies across Brazil, developed algorithms that they used in conjunction with Google Earth Engine to conduct the analysis. After training the algorithms on images of mining operations – desolate landscapes where forests have been converted into a collection

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of sand dunes pockmarked by mining ponds – the team ran its analysis on a freely available archive of imagery captured by the US Landsat programme, and then analysed trends on Indigenous lands and other protected areas where mining is not allowed.

Over the past decade, illegal mining incursions – mostly small-scale gold-extraction operations – have increased fivefold on Indigenous lands and threefold in other protected areas of Brazil such as parks, the data show (see ‘Mining incursions’). The findings agree broadly with reports from Brazil’s National Institute for Space Research (INPE) in São José dos Campos, which monitors the country’s forests and has been issuing alerts about mining incursions for several years.

“We kind of knew that this was happening, but to see numbers like this is scary even for us,” says Cesar Diniz, a geologist at the geospatial-analysis company Solved in Belém, who led the analysis for MapBiomias.

Clashes on multiple fronts

Aside from being home to their people, Indigenous territories play a part in protecting the Amazon’s biodiversity and the enormous pool of carbon that is locked away in its trees and soils. Numerous studies have found that Indigenous lands, as well as other conservation areas, are effective buffers against tropical deforestation in the Amazon, which is responsible for around 8% of global carbon emissions.

Last month, the International Union for Conservation of Nature (IUCN) approved a motion, put forward by Indigenous groups, calling on governments to protect 80% of the Amazon basin by 2025. Indigenous representatives say they plan to fight for implementation across the Amazon, but the proposal faces a particularly tough sell in Brazil under Bolsonaro, whose pro-business conservative government has scaled back enforcement of existing environmental laws and halted efforts to demarcate new Indigenous territories.

Indigenous groups have also taken their case to the International Criminal Court in The Hague, the Netherlands. On 9 August, the Articulation of Indigenous Peoples of Brazil (APIB), which represents Indigenous groups across the country, filed a complaint with the court accusing the Bolsonaro administration of violating human rights and, they claim, paving a path for genocide by undermining Indigenous rights, reducing environmental protections and inciting incursions and violence through calls for mining and land development. APIB also made it clear that it’s not only Indigenous rights at stake, drawing a direct link between the protection of their territories and of the globe.

“What is needed is a state commitment on the demarcation and protection of Indigenous lands, which are the last barrier against deforestation and forest degradation,” says

Luiz Eloy Terena, an anthropologist and lawyer from the village of Ipegue who coordinates legal affairs for APIB.

During an address to the United Nations General Assembly on 21 September, Bolsonaro said he was committed to protecting the Amazon and emphasized that 600,000 Indigenous people live “in freedom” on reserves totalling 1.1 million square kilometres of land, equivalent to 14% of Brazil’s territory. In the past, Bolsonaro has publicly said that Indigenous peoples have too much land given their sparse population, and has at times called for their “integration”. The Bolsonaro administration did not respond to *Nature’s* requests for comment regarding illegal mining in the Amazon, its Indigenous and environmental policies or the accusations filed with the International Criminal Court.

Existential threat

Brazil earned recognition as a leader in sustainable development during the 2000s. Former president Luiz Inácio ‘Lula’ da Silva and his Workers’ Party put in place policies that helped to curb deforestation in the Amazon by more than 80% between 2004 and 2012.

But the party was dogged by corruption charges that would later land Lula in jail, and its environmental agenda ultimately faltered.

The rate of deforestation in the Amazon, which includes land converted for mining, agriculture and other development, began rising after 2012 and shot up by 44% during Bolsonaro’s first two years in office, according to INPE.

But the biggest threats could be on the horizon. The current government is now pushing legislation in Congress – as well as arguments in a case that is due to come before Brazil’s Supreme Court – that would make it harder to establish new Indigenous lands and could even allow the government to repossess existing lands. Other legislation that has been advanced by Bolsonaro’s supporters in Congress would open up Indigenous lands to industrial development and grant amnesty to people who have illegally invaded public lands.

For Indigenous tribes, the growing damage to their lands and the rainforest pose an existential threat. More than 6,000 Indigenous people descended on Brasília, the country’s capital, in August and September in protest against Bolsonaro’s policies on land demarcation and the environment. They also travelled to Marseille, France, for the IUCN’s World Conservation Congress last month to promote their motion to protect the Amazon basin.

“We will not give up,” says José Gregorio Diaz Mirabal, a member of the Wakueni Kurripaco people of Venezuela and the elected leader of the Congress of Indigenous Organizations of the Amazon Basin. “Science supports us, and the world is waking up.”

MINING INCURSIONS

According to an analysis of satellite imagery, illegal mining in Indigenous territories in the Brazilian Amazon has spiked in the past few years. Studies have shown that protected Indigenous territories help to stave off deforestation and ecosystem degradation.

- Indigenous territories
- Indigenous territories most affected by illegal mining in 2020

