

Editorial

Protecting Amazonia Should Focus on Protecting Indigenous, Traditional Peoples and Their Territories

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The Brazilian proverb “*Uma desgraça nunca vem só*” or “*Misfortunes never come alone*” has, unfortunately, never been more apt than in reference to the risks now facing Amazonia. Deforestation rates have been dramatically increasing in Brazil [1], with a total of 34,200 km² newly logged areas since 2019 [2]. In 2021, 13,200 km² of forest was cut down, the highest annual deforestation rate since 2006, when deforestation in Amazonia hit 14,300 km² [2]. Additionally, if deforestation alone was not enough, a severe drought in 2020 together with the COVID-19 pandemic has created a devastating synergism between forest loss, fires, which produce particulate air pollutants, and related health risks, endangering Amazonian Indigenous and traditional peoples [3]. Although it is no secret that deforestation has been dramatically increasing in Amazonia in the past few years [1,2,4,5], too little attention has been given to the plight of Indigenous lands, which have never before experienced such dramatic incursion and illegal deforestation. According to a report just released by the Brazilian National Institute for Space Research (INPE), deforestation within Indigenous lands has reached 331.1 km² in 2021 [2]. The average of the annual deforestation rates within Indigenous lands in the last three years (2019–2021) is ~81% above the decadal average rate [2]. In addition to deforestation, illegal mining is a growing threat within Indigenous lands [6–9]. As can be seen in Figure 1, deforestation within the Indigenous lands of the Brazilian Amazon in the past three years has been occurring with particular intensity in the eastern region, in the so-called “Arc of Deforestation”.

Recent and emerging research is addressing the urgent need to understand increasing deforestation in Protected Areas and Indigenous lands and its impact on the health and livelihoods of Amazonian peoples and ecosystem services. de Oliveira et al. [10] evaluated the relationship between deforestation, land use and land cover (LULC) changes and fire emissions in the Apyterewa Indigenous Land, Eastern Brazilian Amazon. Combining a geographic object-based image analysis (GEOBIA) to map LULC with the Brazilian Biomass Burning Emission with Fire Radiative Power (3BEM_FRP) model, they estimated the dangerous particulate pollution (particles with a diameter less than 2.5 µm, PM_{2.5}) produced by deforestation and fire. The GEOBIA approach revealed a remarkable increase in deforestation, with the conversion of primary forests to agriculture within the Apyterewa Indigenous Land reaching 200 km² between 2017 and 2019, which was clearly associated with an increase in the PM_{2.5} emissions from fire. Between 2004 and 2016, the annual

average emission of $\text{PM}_{2.5}$ was estimated to be 3594 tons per year⁻¹, whereas the most recent interval of 2017–2019 had an average of 6258 tons per year⁻¹. This represented an increase of 58% in the annual average of $\text{PM}_{2.5}$ associated with fires for the study period, contributing to respiratory health risks and the air quality crisis in Brazil in late 2019. Mataveli et al. [4] went on to combine $\text{PM}_{2.5}$ emissions estimated from the 3BEM_FRP model and deforestation based on the MapBiomass Amazonia dataset to assess, for the first time, how deforestation drove biomass burning emissions in Amazonia over the last two decades at three scales of analysis (Amazonia-wide, countries/states and grid cell). Amazonia accounted for 48% of $\text{PM}_{2.5}$ emitted from biomass burning in South America, whereas current deforestation rates have reached values on par with the alarming rates of the early 21st century. Emissions and deforestation were concentrated in the Eastern and Central–Southern portions of Amazonia. Amazonia-wide deforestation and emissions were linked over time. Countries/states with the greatest extent of agricultural lands were less likely to be correlated at this scale; however, this is likely because biomass burning in agricultural practices partially decouples deforestation from fire prevalence. Concentrated in regions of ongoing deforestation, in 18% of Amazonia grid cells, $\text{PM}_{2.5}$ emissions associated with biomass burning and deforestation were significantly positively correlated. According to the authors, deforestation is an important driver of emissions in Amazonia but does not explain biomass burning alone. Future work must link climate and other non-deforestation drivers to further elucidate the factors contributing to dangerous pollution emissions from biomass burning in Amazonia.

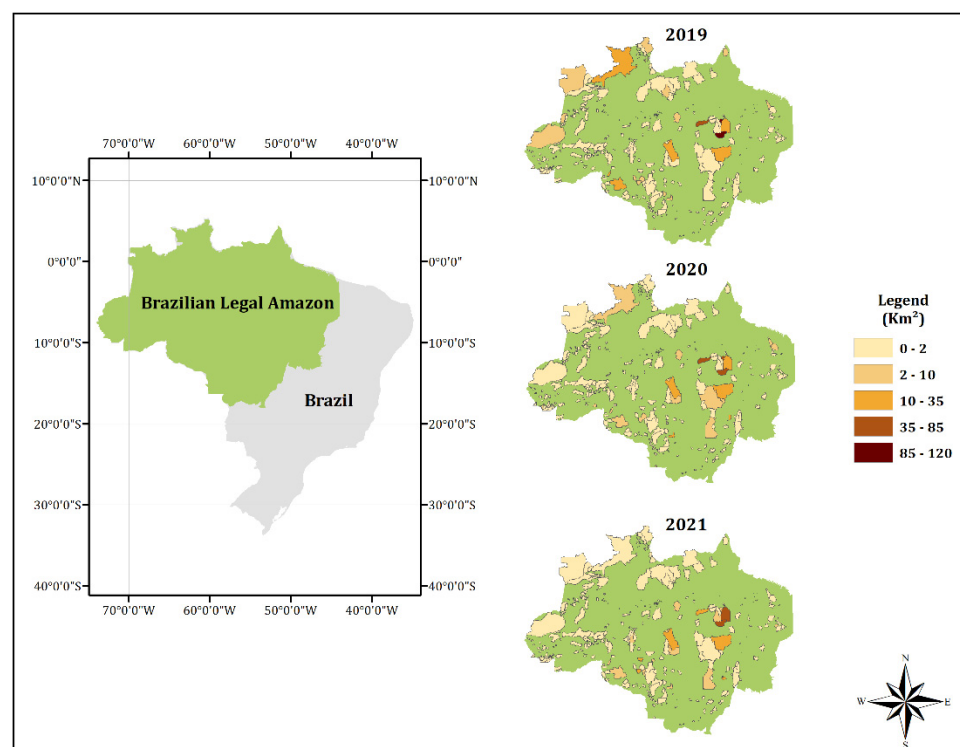


Figure 1. Deforestation within Indigenous lands in the Brazilian Legal Amazon between 2019 and 2021. Annual deforestation rates were obtained from the National Institute for Space Research [2].

In Guerrero et al. [11], the authors pointed to another important factor related to the devastation of pristine, protected areas. They presented a temporal analysis of LULC change over a 33-year period (1985–2018) within the influence zone of the Braço Norte Hydropower Complex, Brazilian Amazon, using the Collection 4.1 level 3 LULC maps of the freely available MapBiomass dataset. Their findings showed that the most impacted LULC during this period was forest formation (from 414 km² to 287 km², a reduction of 69%), with a primary shift to pasturelands (increase of 664%, from 40 km² to 299 km²). The

construction of the hydropower complex also triggered indirect impacts such as urban expansion in 2018 and an associated increase in local demand for crops. These results reveal the need for special policies that minimize the local impact of dam construction to protect important forestland, for example, through the creation of Protected Areas. Furthermore, locally adjusted parameters defining ecological–economic zoning should be adopted to balance environmental health and social benefits for Indigenous peoples, riverine population, and artisanal fishermen that depend on healthy rivers. LULC change is an essential component for monitoring environmental change and managing natural resources in areas of high natural and cultural biodiversity. Heredia-R et al. [12] conducted a revealing study in an area located in the northern Amazon of Ecuador, specifically in the Diversity and Life Zone (DLZ) of the Yasuni Biosphere Reserve (YBR). The aim of their study was to investigate the dynamics of LULC changes to support policies for environmental and sociocultural protection in the DLZ. Multitemporal satellite imagery, open-access Landsat images downloaded from the United States Geological Survey (USGS), were used to map changes in LULC divided into three time stages (1999–2009, 2009–2018, 1999–2018). The results showed that in the period 1999–2018, most of the changed LULCs were transformed into pastures in the DLZ. The authors concluded that it is imperative to improve territorial planning, to avoid conflicts between Indigenous peoples, migrant settlers, and uncontacted Indigenous peoples that live in the DLZ within the YBR.

As the studies described above show, Indigenous, traditional peoples and their territories are being significantly impacted by illegal deforestation. Even while formally protected by law, Indigenous peoples have limited resources to fight against illegal timber harvesting; therefore, deforestation is a general consequence. Indigenous lands management and monitoring has historically been focused solely on the legally bounded territory. However, this risks ignoring the pressures and land conversion dynamics building in neighboring areas, which are increasingly spilling into these Protected Areas, threatening residents and reducing the integrity and ecological functioning of the protected forest. The weakening of environmental law enforcement is coincident with the observed increase in LULC changes and deforestation in Indigenous lands [9]. Indigenous and traditional peoples are the “soul” of the Amazon, and everything should be done to protect them and their territories. Furthermore, empowering native people to control their land is one of the most effective approaches to long-term intact forest conservation [13]. To reverse the current scenario in the Amazon over the long-term, environmental education is key, as is the implementation of sustainable agricultural practices and development of conservation policies to promote forest regrowth in degraded areas. In the short term, appropriate federal government agencies in Brazil and other Amazonian nations should act swiftly to reduce illegal deforestation and combat rising anti-indigenous violence [9,14] in Indigenous lands, sending a strong message that these Protected Areas are legally controlled and monitored, in order to stop future invasions. Only such changes will enable the maintenance of environmental stability in Amazonia, contain further deforestation and degradation, and, most importantly, safeguard Indigenous and traditional peoples’ long-term well-being, ways of life, and cultural heritages.

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