

Law and Order Guarantee Operations in the Legal Amazon: fight against environmental illicit

Operaciones de Garantía de la Ley y del Orden en la Amazonia Legal: combate a los ilícitos ambientales

Abstract: The adoption of Law and Order Guarantee Operations (GLO) by the Federal Government in the Legal Amazon represents a paradigm break, since these operations, in a way, are recurrent in other regions of the national territory. Common to be adopted in cases of public security crisis, this mechanism provided for in the Federal Constitution was adopted to guarantee the protection of the environment in 2019 and 2020/2021. The work, based on bibliographic research and websites, aims to analyze sources and data about Operations Verde Brasil 1 and 2, called by the author as “GLO Ambiental” and found that both were fundamental to reduce and inhibit environmental illicit, as well as, promoted the strengthening of the actions of partner institutions Operations of Cooperation and Coordination with Agencies (OCCA).

Keywords: legal Amazon; deforestation; burning; environmental GLO.

Resumen: La adopción de Operaciones de Garantía de la Ley y del Orden (GLO) por el Gobierno Federal en la Amazonia Legal representa la ruptura de paradigma, una vez que esas operaciones, de cierta forma, son recurrentes en otras regiones del territorio nacional. Comunes de ser adoptadas en los casos de crisis de la seguridad pública, este mecanismo previsto en la Constitución Federal fue adoptado en el ámbito de garantizar la protección del medio ambiente, en los años 2019 y 2020/2021. El trabajo, basado en la investigación bibliográfica y en sitios, busca el análisis de fuentes y datos sobre las Operaciones Verde Brasil 1 y 2, denominados por el autor como “GLO Ambiental” y constató que ambas fueron fundamentales para disminuir e inhibir ilícitos ambientales, así como, promovieron el fortalecimiento de las acciones de instituciones asociadas por medio de Operaciones de Cooperación y Coordinación con Agencias (OCCA).

Palabras clave: Amazonia legal; deforestación; quemas; GLO ambiental.

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1 Introduction

Actions that cause damage to the environment in the Legal Amazon gain visibility in Brazil and abroad, generating the adoption of measures by the State, which seek to mitigate the effects of these harmful actions and make public the country's commitment to legality and respect for commitments made abroad regarding environmental preservation.

Among the actions that degrade the environment (REDE AMAZÔNICA DE INFORMAÇÃO SOCIOAMBIENTAL GEORREFERENCIADA, 2012) it can be mentioned the fires caused by human action, the illegal deforestation and the clandestine extraction of mineral resources in Conservation Units (Unidades de Conservação – UC), in Legal Reserves, in Environmental Protection Areas (Áreas de Proteção Ambiental – APA) and in Indigenous Lands (Terras Indígenas – TI). Similarly, one can mention as a State measure the adoption of Law and Order Guarantee Operations (Operações de Garantia da Lei e da Ordem – GLO), by Presidential Decree, as an infra-constitutional instrument to curb attitudes that violate the legal system and cause disorder in society (BRASIL, 1999, 2001, 2004b, 2010).

Also, it should be noted that the binomial development and preservation (PENNA FILHO, 2013) is present in the national and international agendas given its importance for the socio-economic growth of countries, sometimes becoming a dilemma and being widely discussed by public opinion in Brazil and abroad. In this context, Brazil's role on the world stage is relevant for having almost 60% of its territory covered by the Amazon biome (SOUTO; PAIM; FRANCH, 2018).

The Legal Amazon covers the states of Mato Grosso, Rondônia, Acre, Amazonas, Roraima, Amapá, Pará, Tocantins, and part of Maranhão (west of the 44th meridian), and according to the Institute for Applied Economic Research (DESENVOLVIMENTO CHALLENGES, 2008) this space is intended to foster the economic development of the region, which, according to Penna Filho (2013), encompasses immeasurable biodiversity:

The **forest** holds the largest number of living species on the planet, the largest reserve of fresh water, **precious woods**, vast mineral deposits (many not even mapped), and great potential for generating hydroelectric power, among other resources (PENNA FILHO, 2013, p. 96, emphasis added).

Because of these and other unique characteristics found in the Amazon, the National Defense Policy (Política Nacional de Defesa – PND) (BRASIL, 2020e, p. 25) advocates as one of its national defense objectives to guarantee the sovereignty, national heritage, and territorial integrity. The region in question is the focus of several studies that address the issue of environmental securitization (CAVALCANTE, 2012; URT; PINHO, 2010; WAEVER; BUZAN; WILDE, 1998). In this sense, on this theme there is a search for the dominance of the narrative, sometimes seeking to discourage the economic growth of Brazil, and in particular of its agribusiness, by propagating ideas that the country does not preserve the Amazon environment. In a way, the dilemma arises and is supported by some statements of authorities and foreign Non-Governmental Organizations

(NGOs) (RAMIRES, 2010; PENNA FILHO, 2013), as well as through advertising campaigns that associate the country's development with the disrespect for the environment.

In this context, it is possible to exemplify the above considerations by mentioning the speech of French President Emmanuel Macron, who, on January 12, 2021, declared: "Continuer à dépendre du soja brésilien, ce serait cautionner la déforestation de l'Amazonie. Nous sommes cohérents avec nos ambitions écologiques, nous nous battons pour produire du soja en Europe!" (Figure 1).

Figure 1 – Tweet by Emmanuel Macron



Source: Macron... (2021a, 2021b).

Likewise, it can be observed the NGO WWF-Brazil (2021) that considers that: "The dismantling that the government has been promoting in the environmental area, with the weakening of enforcement agencies, is evident." Also, Greenpeace Brazil (2021, n.p.), with the campaign "Todos pela Amazônia", says: "[...] last year alone, every minute, an area larger than two soccer fields was illegally deforested. More than a thousand trees cut down every minute! That's right: a thousand trees a minute!." The advertising campaigns: "IAmazonia"¹ promoted by Greenpeace of the Netherlands; "Farms here, forests there" (FRIEDMAN; DAVID GARDINER & ASSOCIATES, 2019); and "DefundBolsonaro"², articulated by Brazilian activists, add to the aspects listed above, generating the need for a prompt response from the Brazilian State, in order to guarantee its legitimacy to the nation and the world.

1 Available at: https://media.greenpeace.org/CS.aspx?VP3=SearchResult&ALID=27MZIFJ80RSKF&_ga=&VBID=27MDQ5NPZK-VOH&POPUPPN=1&POPUPID=27MZIFJ8X9TVQ. Accessed on: Mar. 22, 2021.

2 Available at: <https://www.defundbolsonaro.org/>. Accessed on: Mar. 22, 2021.

Available at: https://twitter.com/gen_helena/status/1307038961555079168. Accessed on: Mar. 22, 2021.

Thus, Brazilian authorities, such as the current president of the Federative Republic of Brazil, Jair Messias Bolsonaro, have spoken out, aiming to affirm the country's commitment to environmental preservation. As an example, the president's speech at the opening of the 74th United Nations General Assembly in New York on September 24, 2019 can be cited:

First, my government has a **solemn commitment to the preservation of the environment and to sustainable development** for the benefit of Brazil and the world.

Brazil is one of the richest countries in biodiversity and mineral wealth.

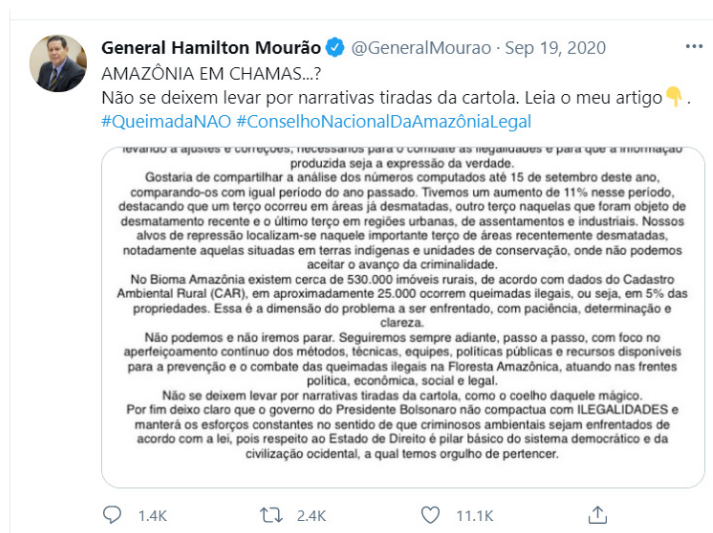
Our Amazon is larger than the whole of Western Europe and **remains almost untouched**. Proof that we are **one of the countries that most protect the environment** (BRASIL, 2019c, n.p., emphasis added).

President Bolsonaro's October 22, 2020 speech at the Itamaraty Palace on the occasion of the graduation ceremony for the new Diplomats of the Rio Branco Institute reaffirms the same narrative:

We are finalizing a **trip Manaus – Boa Vista**, where we will invite diplomats from other countries to show in that short trip of an hour and a half, that **they will not see** in our Amazon forest **anything burning** or even a hectare of **devastated** jungle (MAZUI, 2020, n.p., emphasis added).

Similarly, the vice president of Brazil, Army Reserve General Hamilton Mourão, who is also the president of the National Council for the Legal Amazon (BRASIL, [2021d]), whose motto is: "Protecting and preserving the Amazon is developing Brazil," has positioned himself in response to arguments that associate the country with environmental degradation practices (Figure 2).

Figure 2 – Tweet by General Hamilton Mourão



Source: Mourão (2020).

Likewise, the then Minister Tereza Cristina, of the Ministry of Agriculture, Livestock and Supply (Ministério da Agricultura, Pecuária e Abastecimento – MAPA) broadcasted on her Twitter (DIAS, 2020) a video on Brazilian land title regularization, showing that the Federal Government has obtained excellent results in agribusiness allied with environmental preservation; the Chief Minister of the Institutional Security Cabinet (Gabinete de Segurança Institucional – GSI) of the Presidency, Army Reserve General Augusto Heleno; among others seek to counterpoint foreign and domestic statements and campaigns in order to preserve the country's image on the international scene (Figure 3).

Figure 3 – Tweet by General Augusto Heleno

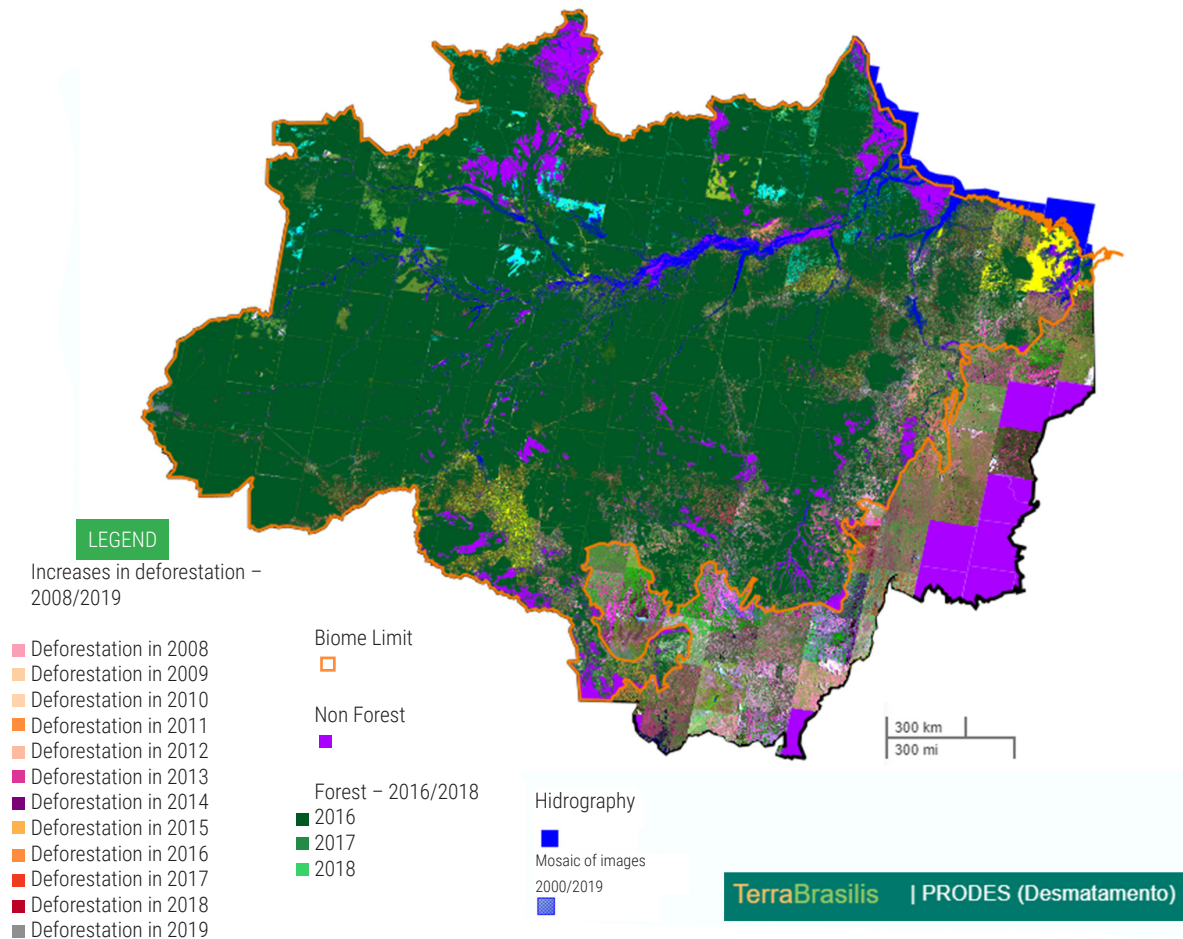
I record the position of the Institutional Security Office (whose Portuguese acronym is GSI) on the Amazon. They are more than 5 million km², with several biomes, most of them practically virgin. Our President of the Republic is passionate about this very rich piece of Brazil and will never allow its degradation, due to deforestation, fires or unsustainable exploitation. Improving the inspection of this immense area, where all of Western Europe fits, is a Herculean task. Brazil will not run away from its responsibility and, contrary to what has been falsely advertised, will use all available resources for the environmental defense of the Brazilian Amazon. Its sustainable and judicious exploitation will be carried out for the benefit of the Brazilian people..

Source: Heleno (2019).

Thus, this qualitative study aims to address the GLO Operations conducted in the Legal Amazon through Operations Verde Brasil 1 (2019) and Verde Brasil 2 (2020 and the first months of 2021), which the author chose to call "Environmental GLO" Operations because they are related to the fight against environmental crimes in the Amazon region (SOUZA, 2020), emphasizing that the numbers of hot spots and deforestation that occurred in the Amazon in the years 2019 and 2020 and in the months of January and February 2021 will be taken into consideration in order to answer the following problem question: how did the Environmental GLO conducted by the Armed Forces contribute to the reduction of the rates of burning and deforestation in the Legal Amazon between the years 2019 and 2021?

Thus, to answer the question above, a bibliographic and documental research was carried out in governmental and non-governmental sites, in Brazil and abroad, in order to obtain subsidies to be analyzed for the solution of the problem in question. In addition, the legal instrument of GLO operations for the preservation of the environment will be highlighted by analyzing Verde Brasil Operations 1 and 2, which represent a paradigm shift by not being specifically aimed at responding to public security crises, when they were commonly adopted.

The paper is organized as follows: the present introduction, a section dealing with deforestation and fires, and the tools for monitoring deforestation and hot spots in the Legal

Map 1 – Amazon Biome and Legal Amazon³

Source: Adapted from TerraBrasilis (2020).

In this context, Map 1 (below), which also presents the Amazon biome (delimited by the orange line) and the Legal Amazon (black line), consolidates information about the deforestation that occurred in the Amazon region in the period from 2008 to 2019, aiming to characterize the problem at hand by listing aspects related to deforestation itself and the fires that occur in the region. It is worth noting that deforestation is the operation that aims at the total suppression of native vegetation in a given area for alternative land use (BRASIL, 2019b) and, in turn, degradation is a partial disturbance in the forest caused by timber extraction and/or forest burning, according to the Amazon Institute of Man and Environment (Instituto do Homem e Meio Ambiente da Amazônia – IMAZON, 2020).

3 Map generated with the following settings: platform TerraBrasilis – Project for Monitoring Deforestation by Satellite (Projeto de Monitoramento do Desmatamento por Satélite – PRODES), no deforestation mask, biome boundary enabled, no cloud (2016/2019), forest option (2016/2018) enabled, hydrography and non-forest options enabled, deforestation increments (2008/2019) enabled, image mosaic option (2000/2019) enabled, and use of the *blank* layer.

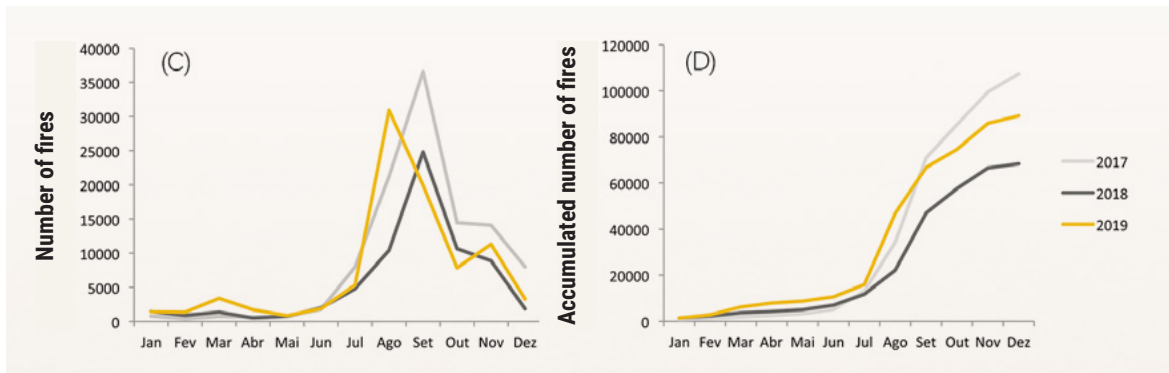
Alencar et al. (2020, p. 3) addresses how the Amazon being "a humid and evergreen forest becomes susceptible to fire during certain periods of the year" by listing three fundamental elements that organize themselves in the so-called "fire triangle" and that, when combined, create conditions for fires and wildfires to thrive.

The first of the three ingredients of this triangle is the existence and quality of **the combustible material** (what burns). The second is the **climatic conditions** (when it burns) and the third is the **ignition source** itself (who or what causes the burning) (ALENCAR et al., 2020, p. 1, emphasis added).

In this sense, Alencar et al. (2020, p. 4, emphasis added) emphasizes that "the third ingredient is the one that is easiest to control: the ignition source. [...] Therefore, in the Amazon, every fire has as its source a match lit by a human being."

Building on the considerations of Alencar et al. (2020), the author included in the present work Graphs 1 and 2 (see below)⁴ that consolidate data from the years 2017, 2018, and 2019 on the numbers of hot spots and on deforestation in the Amazon in the months and cumulative of the respective year, after mentioning the periods from 1985 to 2019 (Infographic 1) and from 2008 to 2019 (Map 1) that allowed for a holistic view on the topic at hand.

Graph 1 – Numbers of hot spots in the month (C) and cumulative (D) in the Amazon (2017, 2018 and 2019)



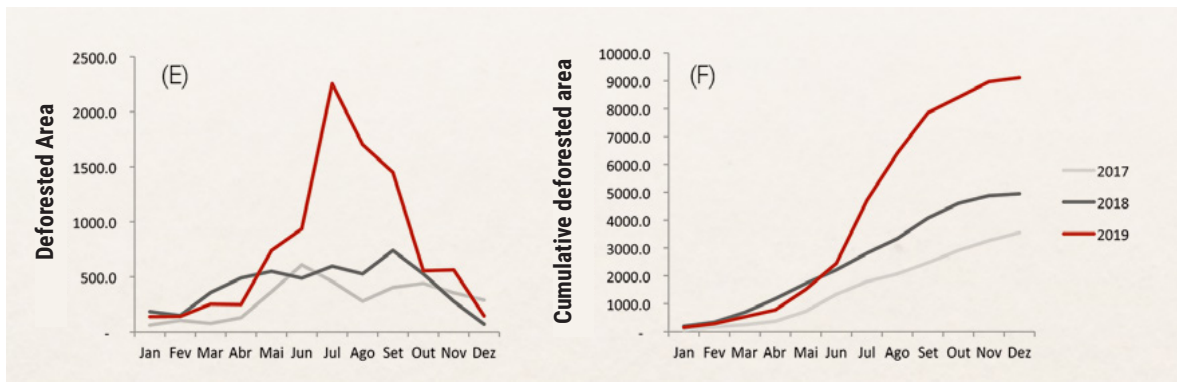
Source: IPAM (2019) apud Alencar et al. (2020, p. 6).

⁴ From climate data from the Chirps satellite and fire and deforestation data from INPE through November 2019.

It is inferred that in the analyzed period (2017, 2018 and 2019), the highest incidence of hot spots occurs between the months of July to December and that the year 2019 was marked by an increase in hot spots compared to 2018, since in the year 2018 there was a reduction compared to 2017 (see Graph 1).

The fact that more fires occurred in 2019 than in 2018, was also noted by Non-Governmental Organization that expressed, "The world watched in astonishment as the number of fires in the Amazon increased" (WWF BRASIL, 2020, p. 40). According to official data from the Brazilian National Institute for Space Research (Instituto Nacional de Pesquisas Espaciais – INPE), the jump was 30% in 2019 compared to 2018. From January to December 2019, 89,178 fires were recorded in the biome, compared to 68,345 in the previous period (WWF Brazil, 2020).

Graph 2 – Deforestation in the month (E) and accumulated (F) in the Amazon (2017, 2018 and 2019)

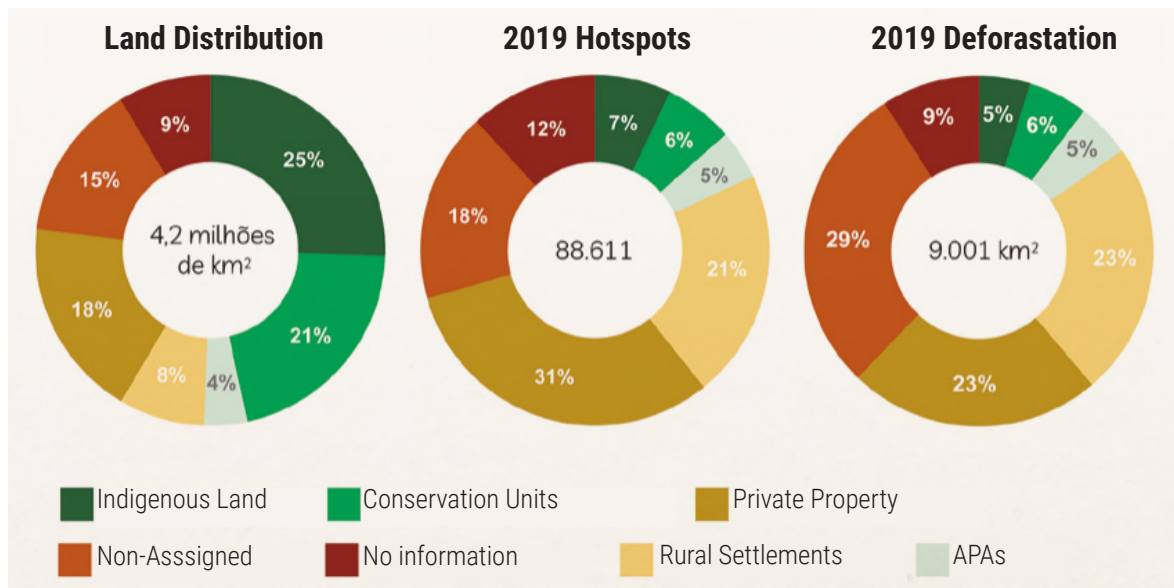


Source: IPAM (2019) apud Alencar et al. (2020, p. 6).

Likewise, it is inferred that in the same period analyzed, the highest incidence of deforestation occurred between the months of April to December and that the year 2019 had more than 9,000 km² of deforested area considering the accumulated months of the year considered, thus reaching a higher number than the years 2017 and 2018 (see Graph 2).

With the understanding of the data from the years 2017, 2018 and 2019 on the numbers of hot spots and on deforestation in the Amazon, it can be seen the numbers for the year 2019, as shown in the figure below

Figure 4 – Amazon hot spots and deforestation in 2019 by land category



Source: IPAM (2019) apud Alencar et al. (2020, p. 7).

Analyzing Figure 4 it is inferred that the 2019 INPE data show that only 18% of the 2019 hot spots occurred in TI (7%), in UC (6%), and in APA (5%); and that 16% of the deforestation of the same year were recorded in the same areas (TI - 5%, UC - 6% and APA - 5%), emphasizing that such areas together represent about 50% of the total area (4.2 million km²), i.e., the hot spots and deforestation of the year 2019 occurred with a higher incidence in private properties, rural settlements and in undesignated and uninformed areas.

In addition, experts on environmental issues relate the fires to deforestation, and according to Alencar et al. (2020, p. 1): "The 2019 fire season in the Amazon was clearly related to increased deforestation, not to a drier climate; [...]". Also, according to Alencar et al. (2020, p. 1) "the increase in deforestation in 2020, added to the vegetation felled in 2019 that did not burn, creates expectations of a new intense fire season; [...]".

Accumulated deforestation in the Legal Amazon in the last 10 months, from August 2019 to May 2020, is already 72% higher than that recorded in the same previous period, based on data from INPE's Real-Time Deforestation Detection⁵ (Detecção do Desmatamento em Tempo Real – DETER) system (ESCOBAR, 2020). "All warning systems point to an upward trend," says the geographer Marcos Reis Rosa, a doctoral student at the School of Philosophy, Literature, and Human Sciences at USP and technical coordinator of the MAPBIOMAS project (ROSA, 2020 apud ESCOBAR, 2020). In total, 56,867 alerts were identified, validated,

⁵ The DETER operating system is a rapid alert survey of evidence of forest cover change in the Amazon and uses MODIS sensor data. It was developed as an alert system to support the inspection and control of illegal deforestation and forest degradation by IBAMA, detecting changes in forest cover with an area larger than 25 hectares (BRASIL, 2019b, p. 82). The PRODES operational system produces annual deforestation rates (BRASIL, 2019b, p. 78) and considers "deforestation" to be areas greater than 6.25 hectares, analyzing clearcutting deforestation processes that result in the complete removal of forest cover (BRASIL, 2019b, p. 80).

and refined throughout the country, resulting in 1,218,708 hectares (12,187 km²) of deforestation. Eighty-three percent of these alerts (63% of the area) are in the Amazon biome, with a total area of 770,000 hectares (MAPBIOMAS, 2020b).

Also, according to Escobar (2020), more than 99% of the almost 57 thousand alerts analyzed by the "MAPBIOMAS Alerta" project have some irregularity associated; either because the deforestation was done without legal authorization or because it advanced over some prohibited area, such as Conservation Units, Indigenous Lands, or Permanent Preservation Areas (Áreas de Preservação Permanente – APP).

Similarly, it can be seen in Table 1 below that comparing the first quarter of the years 2019 and 2020, it can be seen, in general (total values), a decrease in hot spots, but an increase in the deforested area. And, in particular, increased hot spots on private property (57%) and deforestation in undesignated areas (33%) in 2020 to the same period considered of 2019.

Table 1 – Numbers of hot spots and deforestation in the Amazon, broken down by land category, in the first quarter of 2019 and 2020.

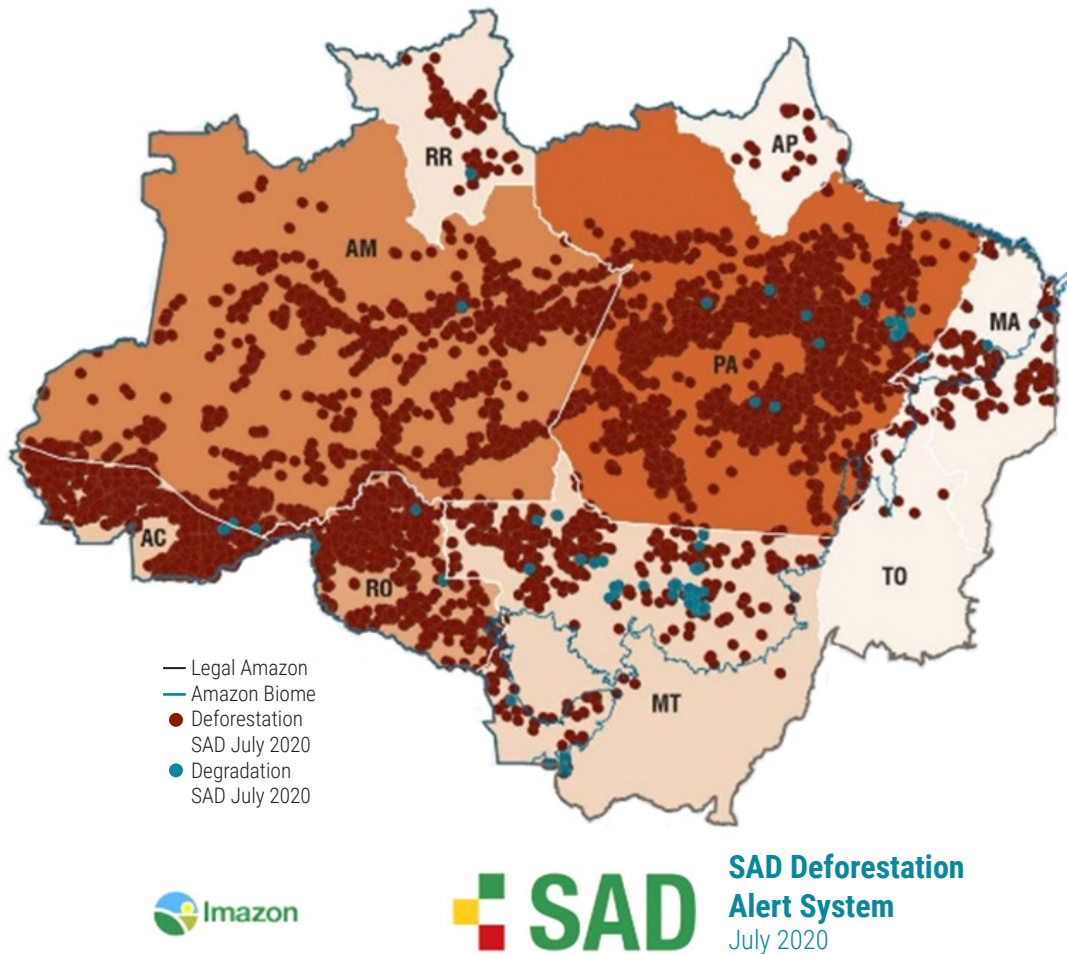
Land category	Hot spots Jan – Mar 2019	Hot spots Jan – Mar 2020	Deforestation Jan – Mar 2019	Deforestation Jan – Mar 2020
Indigenous Land	14%	17%	3%	2%
Conservation units	3%	1%	3%	2%
Permanent Preservation Areas	2%	1%	2%	3%
Private Properties	39%	57%	38%	30%
Settlements	20%	11%	24%	17%
Unassigned	17%	7%	22%	33%
No information	5%	6%	8%	13%
Total	6.169	4.445	511 km ²	783 km ²

Sources: The Author, based on IPAM (2019) apud Alencar et al. (2020, p. 8).

In the same line, aiming to analyze more data already released for the year 2020, the deforestation and degradation in the month of July 2020 in the Legal Amazon based on IMAZON's Deforestation Alert System (Sistema de Alerta de Desmatamento – SAD) can also be highlighted (see Map 2).

According to IMAZON's SAD (2020), in the period from August 2019 to July 2020, deforestation in the Legal Amazon had increased by 29% compared to the same previous period (from August 2018 to July 2019). In July 2020, specifically, SAD detected an 11% reduction in deforestation in the Legal Amazon compared to July 2019. However, there was a 110% increase in forest degradation, corresponding to 135 km². Also, the SAD pointed out that in July 2020, 59% of deforestation occurred in private areas or under various stages of ownership and the rest of the deforestation was recorded in Settlements (19%), UC (18%), and TI (4%).

Map 2 – Deforestation and Degradation in July 2020 in the Legal Amazon



Source: Adapted by Natã Lemos. Instituto do Homem e Meio Ambiente da Amazônia (2020).

Analyzing the 2019 data and comparing it with the 2020 data, which have already been released, it can be seen that in 2020 the hot spots and deforestation occurred with greater emphasis on private properties to the detriment of incidences in UC, TI, and APA.

Furthermore, according to IMAZON's SAD (2021), in February 2021, SAD detected a 74% increase in deforestation in the Legal Amazon compared to February 2020. This deforestation detected in February occurred in Pará (37%), Roraima (27%), Mato Grosso (13%), Amazonas (12%), Rondônia (6%), Maranhão (3%), Acre (1%), and Tocantins (1%). Likewise, there was a 38% increase in forest degradation, from 37 square kilometers in 2020 to 51 square kilometers in 2021. By February 2021, degradation was detected in Pará (71%), Mato Grosso (27%), and Roraima (2%). The SAD also pointed out that in February 2021, most (60%) of the deforestation occurred in private areas or under various stages of ownership and the rest of the deforestation was registered in Settlements (22%), Conservation Units (17%) and Indigenous Lands (1%).

Also, in order to facilitate the visualization of the various tools used for monitoring deforestation and fires in the Amazon, the author has consolidated national and international sources in Table 2.

Table 2 – Deforestation monitoring systems in the Amazon

Institution	App/Platform Mission/System	Observation/Reference (access on: Sep. 17, 2020 and Mar. 27, 2021)
Brazilian Federal Government	App “Guardiões da Amazônia”.	It allows the sending of reports of environmentally damaging acts. https://www.gov.br/pt-br/apps/guardioes-da-amazonia
INPE	TerraBrasilis Web Platform.	http://terrabrasilis.dpi.inpe.br/app/map/deforestation
INPE	Missão Amazônia. It will provide remote sensing data (images) to observe and monitor deforestation especially in the Amazon region, and also the diverse agriculture throughout the country.	Amazonia 1 (AMZ 1) is the first Earth Observation satellite completely designed, integrated, tested and operated by Brazil. http://www.inpe.br/amazonia1/
INPE-EM	INPE – <i>Emission Model</i> .	It makes available spatially the annual estimates of greenhouse gas emissions from land cover change. http://inpe-em.ccst.inpe.br/en/home/
INPE	Programa Queimadas (includes APA — parks, forests, municipal, state and national biological reserves — and TI).	It allows the operational monitoring of active fires and forest fires detected by satellites, and the calculation and prediction of vegetation fire risk, as well as the mapping of burned area scars. https://queimadas.dgi.inpe.br/queimadas/portal/informacoes/apresentacao
IMAZON	Sistema de Alerta de Desmatamento (SAD).	Releases the Legal Amazon deforestation bulletin using (SAD) with support from the Gordon and Betty Moore Foundation and Norway’s International Climate and Forest Initiative (NICFI) and The Norwegian Agency for Development Cooperation (Norad) https://amazon.org.br/categorias/sad-alerta/
Instituto Socioambiental (ISA)	Sistema de Indicação por Radar de Desmatamento na Bacia do Xingu (SIRAD X).	https://xingumais.org.br/siradx
Defense Ministry	Sistema integrado de alertas de desmatamento com radar orbital – SIPAMSAR (Radar de Abertura Sintética).	Centro Gestor e Operacional do Sistema de Proteção da Amazônia (CENSIPAM). http://www.sipam.gov.br/projeto-amazonia-sar-1/o-sistema-integrado-de-alertas-de-desmatamento-com-radar-orbital-sipamsar

Institution	App/Platform Mission/System	Observation/Reference (access on: Sep. 17, 2020 and Mar. 27, 2021)
Japan International Cooperation Agency	Forest Early Warning System in the Tropics (JJ-FAST).	Japan Aerospace Exploration Agency (JICA-JAXA). https://www.eorc.jaxa.jp/jjfast/jj_index.html
University of Maryland	Global Land Analysis and Discovery (GLAD). All Eyes on the Amazon.	https://glad.umd.edu/projects/all-eyes-amazon

Source: The Author based on IPAM (2019) apud Alencar et al. (2020, p. 8).

These tools have a high added value and allow the monitoring of deforestation and the survey of hot spots in the Amazon region in real-time, offering fundamental elements for the decision-making of the actors who work in synergy with the GLO operations.

It can be partially concluded that in the analyzed period, the hot spots and deforestation occurred less in PA, TI, and APA in relation to private areas or under different stages of ownership. Furthermore, it was observed that the aspect of degradation requires attention from the public authorities, considering the data from July 2020 and February 2021 of SAD/IMAZON, impacting the actions of governments to preserve the environment.

3 Environmental GLO in the legal Amazon

In the Legal Amazon, in the years 2019 and 2020, Environmental GLO Operations were adopted by the Federal Government in an "innovative" way, since this type of Military Operation is well known in society in cases of public security crisis⁶ (DIAS; GOMES, 2018; SOUZA, 2020) when, in general, state governors request support from the Federal Government when they recognize that their means are unavailable, non-existent, or insufficient, according to constitutional and infra-constitutional legal support (paragraph 3 of Article 15 of LC 97/1999 (BRASIL, 1999), included in that law by LC 117/2004 (BRASIL, 2004b), PAIM; FRANCHI; FRANÇA, 2020).

"The acronym **GLO** refers to **Law and Order Guarantee** missions by the Armed Forces, which was the **strategy used by the government** in the year 2019 to **contain the advances of the fires** in the region" (ESCOBAR, 2020, n.p., emphasis added).

⁶ In the Amazon region, for example, it can be mentioned events that generated GLO Operations such as the strike of the Public Security Organs (Órgãos de Segurança Pública – OSP) in Maranhão and Rondônia, in Nov. and Dec. 2011 respectively. In this same scope of GLO, we cite Operation Tucuxi (Aug. 28 - Oct. 30, 2018), in Roraima, instated by Decree No. 9,483, Aug. 28, 2018 (PAIM; FRANCHI; FRANÇA, 2020, p. 149,150).

"If we continue with the observed rates it **is expected that deforestation in 2020 will surpass that observed in 2019**; however, the effective implementation of the GLO may contain this advance in the coming months," says the researcher Luiz Aragão, head of INPE's Remote Sensing Division (ARAGÃO, 2020 apud ESCOBAR, 2020, emphasis added).

Thus, it can be observed that even with all the "satellite policing" apparatus, presented in the previous section, there are still few alerts that result in any legal punishment for violators, because of the various logistical and legal difficulties of prosecuting environmental crimes in Brazil. Furthermore, only a tiny portion of the fines imposed are effectively paid, generating a sense of impunity that serves as fuel for the continuation of deforestation (ESCOBAR, 2020).

"The action of the Armed Forces, in the guarantee of law and order, by initiative of any of the constitutional powers, will occur in accordance with the guidelines set forth in an act by the President of the Republic" (BRASIL, 1999), after exhausting the instruments destined to preserve public order and the safety of people and property, listed in article 144 of the Federal Constitution (FC) of 1988 (BRASIL, 2004a, p. 88), according to paragraph 2 of Article 15 of Complementary Law (LC) No. 97 of 1999 (BRASIL, 1999).

Art. 144. **Public security**, a duty of the State, is exercised through the following agencies:

I - Federal Police;

II - Federal Highway Police;

III - Federal Railway Police;

IV - Civil Police;

V - Military Police and **Fire Department** (BRASIL, 2004a, p. 88, our emphasis).

In the case of Environmental GLO Operations in particular, and as mentioned above, it did not occur directly because of a public security crisis, but rather to preserve the environment of the Amazon region. Naturally, due to the dimensions and peculiar characteristics of the area, it would be impossible for the state fire departments to solve the environmental demands in question. Thus, Operations Verde Brasil 1 and 2, Environmental GLO, represented the solution adopted by the Federal Government to minimize such issues, taking into account the capillarity of the Military Organizations in the Legal Amazon (LIMA et al., 2017).

Operation Verde Brazil 1, from August 24 to October 24, 2019, in the states of the Legal Amazon (including border areas, Indigenous Lands, and federal environmental conservation units), supported by Decree No. 9,985, of August 23, 2019 (BRASIL, 2019a), defined preventive and repressive actions against environmental crimes; and survey and combat of fire outbreaks (ARAGÃO; SILVA JUNIOR; ANDERSON, 2020; PAIM; FRANCHI; FRANÇA, 2020).

In the same context as Operation Verde Brasil¹, the Federal Government authorized Operation Verde Brasil 2 with similar characteristics. Published in the Federal Official Gazette through Decree No. 10,341, of May 6, 2020 (BRASIL, 2020a), providing for the employment of the Armed Forces in the Guarantee of Law and Order and in subsidiary actions in the Borderlands, Indigenous Lands, federal environmental conservation units, and other federal areas in the states of the Legal Amazon, in the initial period from May 11 to June 10, 2020 (ARAGÃO; SILVA JUNIOR; ANDERSON, 2020). On June 10, the Environmental GLO was renewed until July 10, through Decree No. 10,394. Likewise, on July 9, it was renewed by Decree No. 10,421 until November 6, 2020 (BRASIL, 2020b). And recently, on November 4, 2020, it was extended until April 30, 2021, by Decree No. 10,539 (BRASIL, 2020c). Operation Verde Brasil 2 aims to carry out preventive and repressive actions against environmental crimes, targeting illegal deforestation and fighting fires. It is worth noting that the operation's focus on illegal deforestation represents an increase over the first edition of the 2019 operation.

Another aspect to be analyzed in this article is what characterizes the GLO Operations, in the sense that they must be episodic, carried out in previously established areas and for a limited time, according to the Ministry of Defense.

It is a military operation determined by the President of the Republic and conducted by the Armed Forces **episodically**, in a **previously established area** and **for a limited period of time**, which aims to preserve public order and the safety of people and property in situations of exhaustion of the instruments provided for in art. 144 of the Constitution or in other situations in which it is presumed possible to disturb order (BRASIL, 2015, p. 192, emphasis added).

Thus, when adopted in two consecutive years, it may cease to be episodic and become recurrent, like the GLO Operations aimed at public security itself, but more time will be needed for analysis in order to reach a conclusion. With regard to the area in which the Environmental GLO Operations encompassed, it is worth analyzing whether they would be too many and for legal security could be more punctual, noting that the region under study represents almost 60% of the national territory. In turn, the aspect that they must occur for a limited time should be considered especially in the case of Operation Verde Brasil 2, which has been taking place since May 11, 2020, and is scheduled to end on April 30, 2021, making up almost twelve months. In the case of Operation Verde Brasil 1, it lasted two months.

Furthermore, according to paragraph 5 of Article 15 of LC 97/1999, which was added to the aforementioned law by LC 117/2004, it is observed that GLO operations occur to a great extent in an interagency environment, that is, in collaboration with other law enforcement agencies:

§ 5º Once the employment of the Armed Forces in the **guarantee of law and order** is determined, the competent authority shall, by means of a formal act, transfer the operational control of the public security agencies necessary for the development of actions to the authority in charge of operations, which shall constitute an **operations coordination center, composed of representatives of the public agencies under its operational control** or with **similar interests** (BRASIL, 1999, emphasis added).

Thus, Environmental GLO occurs in the context of Agency Cooperation and Coordination Operations (Operações de Cooperação e Coordenação com Agências – OCCA), as this inter-agency environment is referred to within the Brazilian Army.

They are **operations executed by elements of the Brazilian Army in support of agencies or institutions (governmental or not, military or civilian, public or private, national or international)**, generically defined as agencies [...]. They are intended to reconcile interests and **coordinate efforts** to achieve converging objectives or purposes that serve the common good. They seek to **avoid duplicity of actions, dispersion of resources, and divergence of solutions**, leading those involved to act with efficiency, effectiveness, efficacy, and lower costs (BRASIL, 2017b, p. 3-14, emphasis added).

Among the various governmental agencies which work in Cooperation and Coordination with the Army, in the context of Environmental GLO Operations, from the political to the operational and tactical level, we can mention the Brazilian Navy (Marinha do Brasil – MB), the Brazilian Air Force (FAB), the Federal Police (PF), the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA) the National Center for Prevention and Fight Against Forest Fires (Prevfogo), the Chico Mendes Institute for Biodiversity Conservation (FUNAI), the National Institute for Colonization and Agrarian Reform (INCRA), the Federal Highway Police (PRF), the National Force, the Brazilian Intelligence Agency (ABIN) and the Operational and Management Center of the Amazon Protection System (Censipam). In addition to different agencies of the Federation Units and the municipalities, such as the Military Police, the Military Fire Brigade, the Civil Police, the Secretariats for the Environment and for State and Municipal Civil Defense and Protection. Each Agency mentioned above has specific responsibilities and attributions in its sphere of action, which, together with those of the Brazilian Army, interact in a synergistic manner, with the objective of mitigating threats to the environment, according to the Ministry of Defense in the book *Defesa e Meio Ambiente: preparo com sustentabilidade* (BRAZIL, 2017a).

Besides the aspects of LC 97/1999 already discussed in this section, it is also worth mentioning Subsection III of Article 17-A of this LC (text added to the aforementioned law by LC 117/2004), which lists the Army's mission as well:

III – **to cooperate** with federal agencies, when necessary, in the repression of crimes with national and international repercussion, in the national territory, in the form of **logistical, intelligence, communications and instruction support** (BRASIL, 1999, n.p., emphasis added).

Such consideration increases the Army's relations with the countless actors of the inter-agency environment, given the legal support due to Operations (SOUZA, 2020). In the same way, the text of Decree nº 3.897, of 24th August 2001, ratifies the device described above:

[...] provide **logistical, intelligence, communications and instruction support**, as well as **advice** to government agencies involved in **actions to ensure law and order**, including in combating transborder and **environmental crimes**, when determined (BRASIL, 2001, n.p., emphasis added).

In this way, the logistical difficulties arising from the dimensions of the Legal Amazon are minimized (ESCOBAR, 2020), and the agencies involved have the opportunity to increase their functional capabilities when supported by the Brazilian Army, whether in logistics, intelligence, communications, and training activities (SOUZA, 2020).

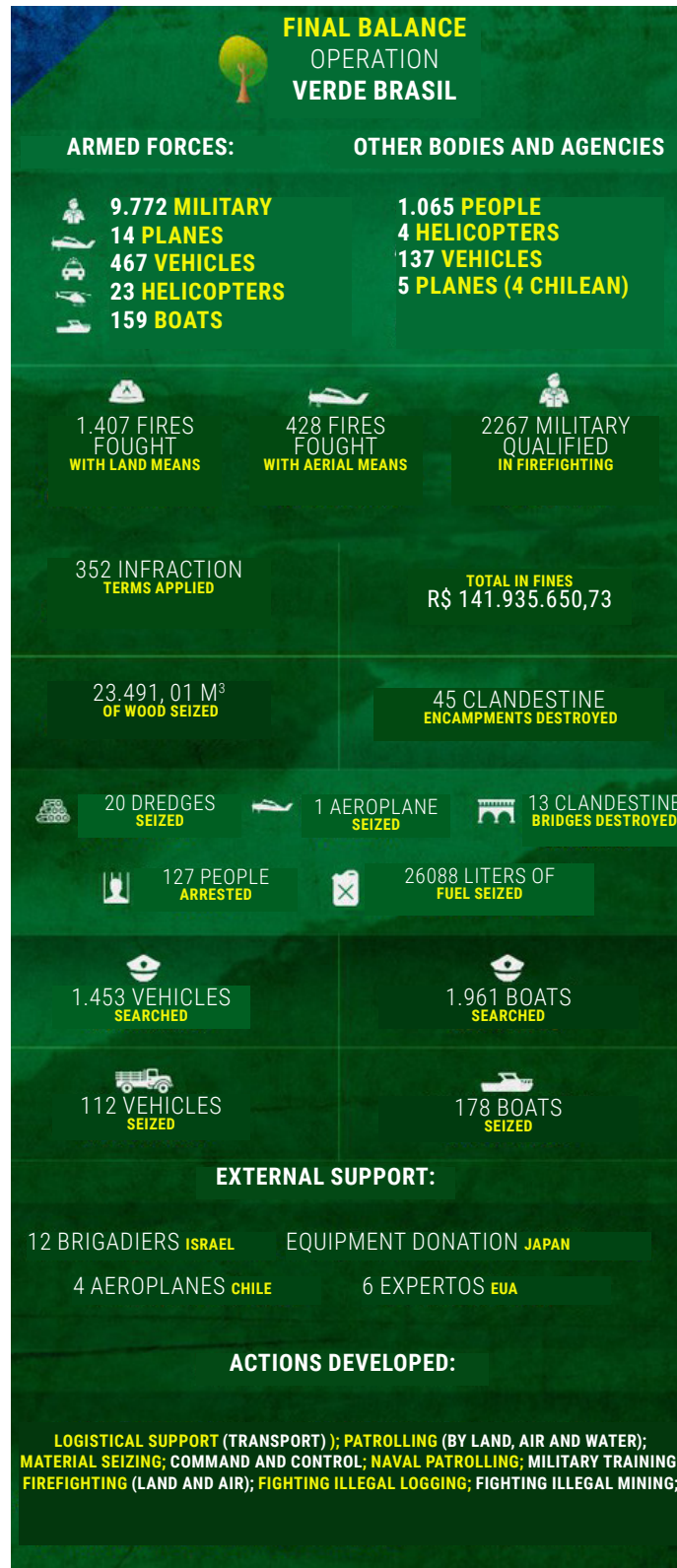
The Federal Government (2019) released the final balance sheet of the tangible results of Operation Verde Brasil 1, which can be analyzed by the data displayed in Infographic 2 below.

Taking into consideration the two months of Verde Brasil 1, it can be seen that the results were in fact positive, given the numbers presented as a result of the actions developed by national and foreign institutions, in addition to the number of fines that were applied, the cubic meters of wood seized, and the number of dredges, vehicles, and vessels seized. The Ministry of Defense (BRASIL, 2019) disclosed that in the first version of Operation Verde Brasil the amount of R\$ 124,482,297.60 was spent, and that if compared with the amounts related to the results of the operation it is assessed that these expenses had a positive return for the preservation of the environment.

Likewise, the partial results of Operation Verde Brasil 2 were released, in order to assess the numerous tangible and intangible benefits for local populations. These results were published in a Note of clarification (BRASIL, 2020d) by the Social Communication Advisory of the Ministry of Defense, on June 29, 2020, when Verde Brasil 2 had just over a month of actions, and had already surpassed Verde Brasil 1 in the amount of fines to be paid.

[...] the amount of **fines** imposed, as of June 27 (**R\$206,082,204.00**), had **already exceeded by three times the amount invested** in the Operation. [...]. A total of 10,404 inspections, patrols, inspections and searches were carried out, and 104 items of equipment such as mining motors, rafts, tractors, excavators, and vehicles, among others, were **rendered unusable**, in accordance with the legislation in force. Also **seized** were 163 boats, 187 vehicles, 139 kilos of marijuana, 218 kilos of cocaine base paste and 24,137 m³ of wood. In addition, 31,880 hectares were **embargoed**, and 133 **arrests** were made (BRASIL, 2020d, n.p., emphasis added).

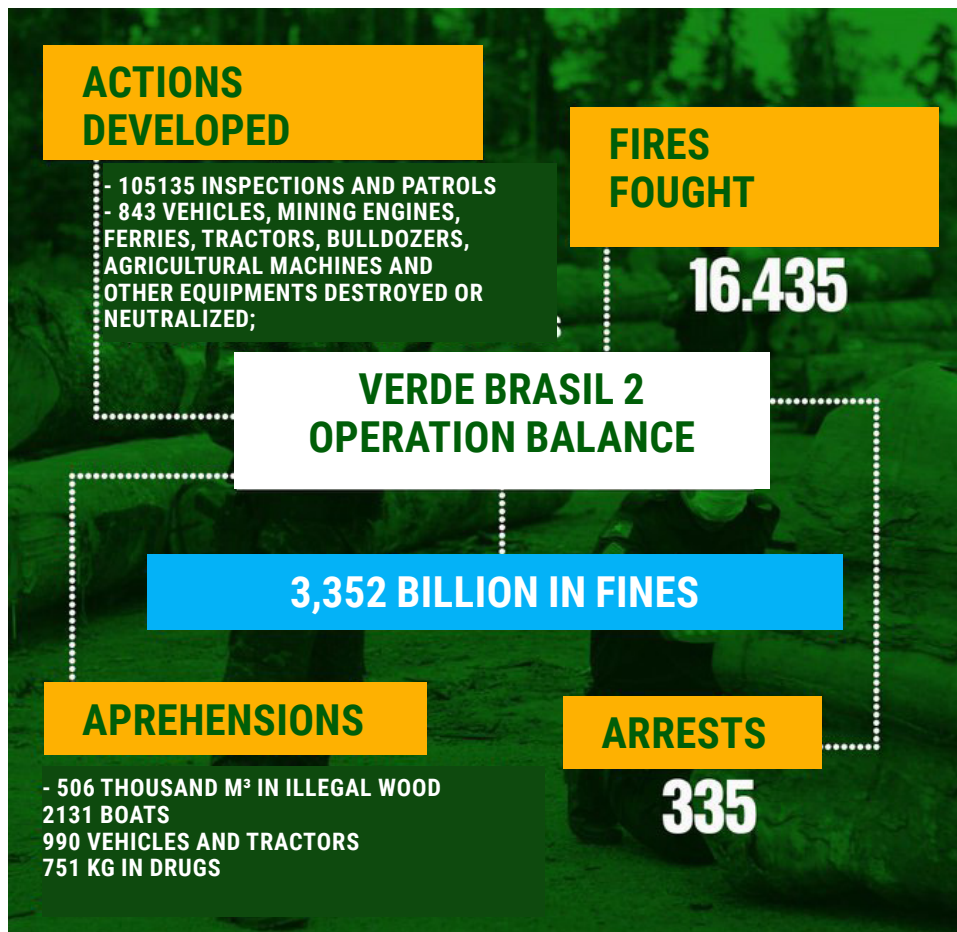
Infographic 2 – Results of Operation Verde Brasil 1 (2019)



Source: Federal Government (2019).

In May 2021, the final balance of the operation was released by the Army, as shown in Infographic 3, ratifying the reach of the actions in favor of environmental preservation.

Infographic 3 – Results of Operation Verde Brasil 2

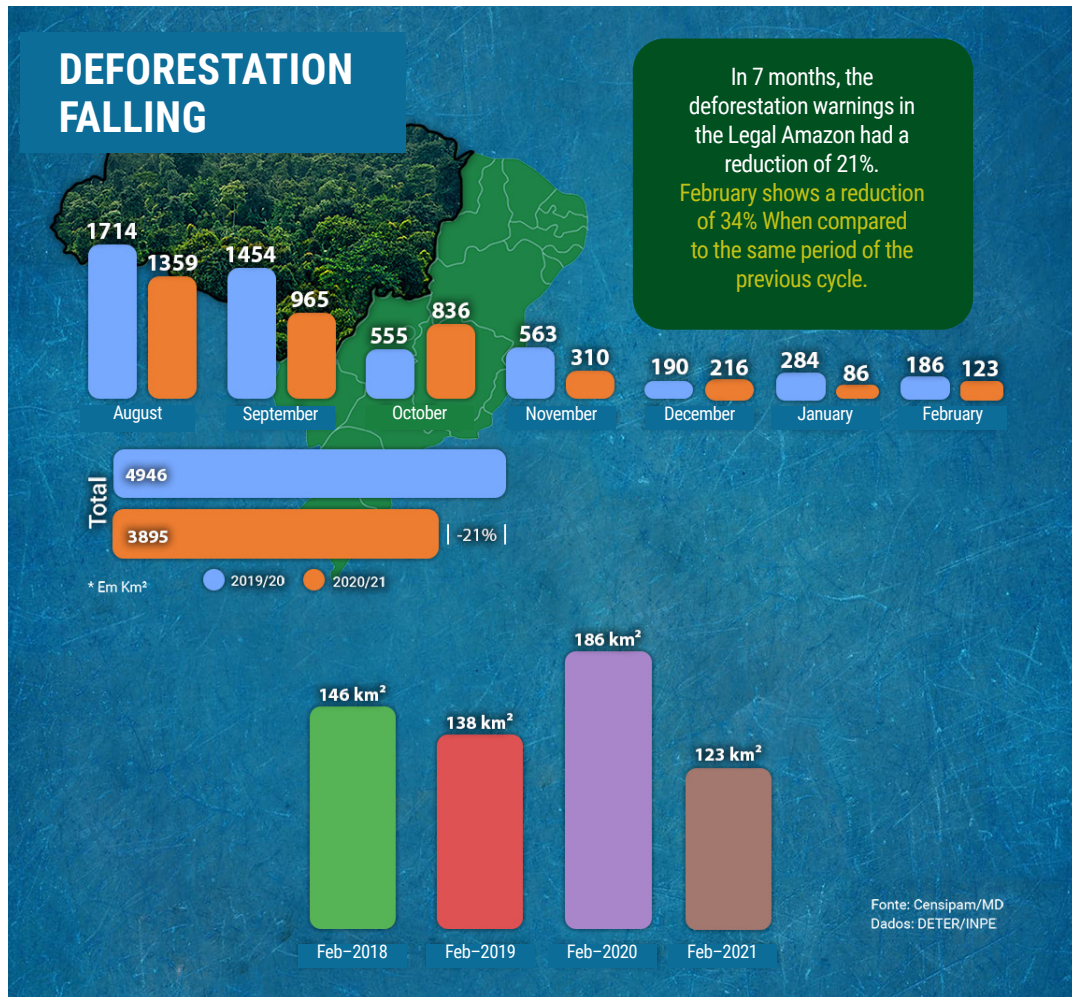


Source: Brasil, 2021a.

The results of Verde Brasil 2 are significant, such as the value of violations that exceeds 3.3 billion reais, which also allows us to infer that the problem of crimes against the environment is serious and requires constant governmental actions in the region. Likewise, it reveals that the preventive and repressive actions against environmental crimes, targeting illegal deforestation and fighting fire outbreaks contribute directly to the preservation of the Amazon biome, as shown in Infographic 4. It is worth mentioning that since the beginning of Operation Verde Brasil 2, the fight against the pandemic of the new coronavirus (WHO, 2020)⁷, has been going on worldwide, but that even in the midst of the Covid-19 crisis, actions on behalf of the environment have not ceased to be carried out.

⁷ Em 11 mar. 2020, o diretor-geral da Organização Mundial da Saúde (OMS), Tedros Adhanom Ghebreyesus, anunciou, em Genebra, na Suíça, que a COVID-19, doença causada pelo novo coronavírus, é caracterizada como uma pandemia.

Infographic 4 – Evolution of deforestation (2019/20 and 21)



Source: Brasil (2021b).

The infographic shows the evolution of deforestation in the periods from August to February and in the transition of the years 2019/2020 (blue bars) and 2020/2021 (orange bars), highlighting that, in seven months, deforestation warnings in the Amazon had a 21% reduction. Besides registering that in the month of February 2021, there was a reduction of 34% compared to the same period in the year 2020.

Furthermore, the Operação Verde Brasil 2 *Hot Site*⁸ consolidates several relevant information (news and videos) about the actions carried out by the involved actors, as well as their results, fulfilling the role of keeping society aware of the environmental problem in the Amazon region. Also, aiming to interact with all citizens, an application was created to be used on mobile or tablet devices: “Guardiões da Amazônia”⁹. Created in the context of Operation Verde Brasil 2,

8 Available at: <http://www.coter.eb.mil.br/index.php/pagina-inicial-verde-brasil>. Accessed on: Mar. 28, 2021.

9 Available at: <https://www.17bdainfsl.eb.mil.br/guardioes/>. Accessed on: Apr. 9, 2022.

in Rondônia, it has the support of the National Council of the Legal Amazon, whose motto is "Protecting and preserving the Amazon is developing Brazil"¹⁰. Through this application it is possible to register complaints of deforestation, fires, and illegal mining, as well as send geo-referenced photos that will be used by inspection agencies to curb such crimes. Furthermore, with the end of the Verde Brasil 2 Operation, the Federal Government has announced that the Amazon Plan 2021/2022 (BRASIL, 2021c), approved by Resolution No. 3 (April 9, 2021), establishes the guidelines for the continuity of enforcement actions and the fight against environmental and land crimes, mainly related to illegal deforestation and fires in the Legal Amazon.

Likewise, taking into consideration the importance of the theme and the growing studies on the Legal Amazon, it is worth clarifying that the Environmental GLO Operations differ from the Ágata Operations, Border Range Operations (PAIM; FRANCHI; FRANÇA, 2020), which have also been conducted by the Ministry of Defense in the Border Range (BRASIL, 1979; 2004a;) of the Legal Amazon and in other border regions of Brazil, since 2011. First because they occur specifically in border regions and second because they are geared to inhibit cross-border crimes, such as smuggling and drug trafficking (DONADIO; KUSSROW, 2016; LIMA et al., 2017). The Verde Brasil Operations are designed to carry out preventive and repressive actions against environmental crimes in the Legal Amazon, including the Borderland Strip.

Finally, it is concluded that the Environmental Law Enforcement Operations carried out in an inter-agency environment are efficient, given the relevant figures presented in this section, contributing to the preservation of the environment and strengthening the other existing institutions in the Amazon region.

4 Final considerations

Nowadays, the issue of environmental preservation is present in the national and international scenarios as a fundamental agenda, because this issue directly impacts social welfare.

In summary, throughout the work it was found that 2019 saw an increase in deforestation compared to 2017 and 2018. Also, the projection that 2020 would trend upward compared to 2019 was proven correct. Such data motivated state actions in the region, particularly materialized by Operations Verde Brasil 1 and 2, which, from the balances presented, allow us to infer that they contributed to the preservation of the Amazon forest.

Thus, the Environmental GLO conducted by the Armed Forces in the Legal Amazon favored the reduction of the rates of fires and deforestation in the Legal Amazon between the years 2019 and 2021, to the extent that they occurred in an inter-agency environment, seeking the necessary synergy to achieve cooperation and coordination among the various actors present. The means employed by the Armed Forces enhance the actions of partner agencies in combating hot spots and deforestation in such a way that logistical difficulties are minimized.

¹⁰ Available at: <https://www.gov.br/planalto/pt-br/conheca-a-vice-presidencia/conselho-da-amazoniahttps://www.17bdainfsl.eb.mil.br/guardioes/>. Accessed on: Apr. 9, 2022

The monitoring tools are important for the survey and analysis of hot spots and possible deforestation locations, including UC, APA and TI, providing accurate data for the actions of the agencies involved in Verde Brasil 1 and 2. Likewise, the adoption of Environmental GLO by the Federal Government presented itself as a viable solution, given the importance of the issue and the need for a prompt response to the Brazilian and international society.

The research highlights that IPAM lists that human action is a preponderant factor in triggering the third fundamental element of the "fire triangle" - the ignition source, which contributes to the occurrence of burnings and fires in the Amazon. Most of the time, it is above the adverse climatic conditions themselves of the intense heat and the large amount of combustible material existing in the region, which reveals the importance of environmental education in society, given the number of resources applied in preventive and repressive actions that guarantee the combat against the hot spots and illegal deforestation in the Amazon.

It is also proposed that the various national monitoring systems listed in Table 2 can be integrated, in order to foster greater unity of information and, consequently, optimize the actions of the competent bodies involved in Environmental GLO operations. Preventive and repressive actions against environmental crimes mitigate fire outbreaks and illegal deforestation, aiming at the preservation of the Amazon biome.

Throughout the work, several governmental websites were consulted to measure the results of the Environmental GLO operations and it was found that these data are released by the Ministry of the Environment, in a more generic way, and by the Ministry of Defense, including the official website of the Brazilian Army, in a more detailed way. Thus, it is suggested for further studies that the agencies supported by the Armed Forces should publicize the results obtained in their respective partnerships, with the aim of rectifying or ratifying the data already disclosed.

Finally, it can be concluded that the Brazilian State's actions, during the researched period, were relevant and contributed to the preservation of the Amazon biome, as well as strengthened the country's image in the concert of nations.

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