



Lawless land in no man's land: The undesignated public forests in the Brazilian Amazon



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ABSTRACT

The Brazilian Amazon has 49.8 million hectares (Mha) of public forestlands not allocated by the federal or state governments to a specific tenure status: the so called undesignated public forests (UPF). Historically, these public forests have been vulnerable to land grabbers and land speculation. Here, we highlighted the imminent threat in UPF by quantifying their accumulated deforestation, all of which is illegal, for the period 1997–2018 and the potential illegal occupation. Based on the available government database, we found that 2.6 Mha of UPF had already been deforested by 2018 resulting in an emission of 1.2 billion tons of CO₂ (Gt CO₂). The accumulated deforestation was 5.4 times higher in federal UPF than in state UPF. Moreover, a total of 11.6 Mha of UPF have already been illegally registered as “private property” in the Brazilian Environmental Rural Registry (CAR), 70 % of these areas located in state UPF. If legalized as private properties, the carbon emissions resulting from additional deforestation will be roughly between 1.2 and 3.0 Gt CO₂. The seriousness and precariousness of protection of Brazilian Amazon UPF, the rapid conversion of forests outside these areas and increased flexibility in land policies - calls for the immediate designation of these areas to some form of conservation, as to avoid irreparable damage to the world's largest rainforest.

1. Introduction

Recently, Azevedo-Ramos and Moutinho (2018) drew attention to the 70 Mha (at that time) of undesignated public forests (UPF) in Brazil with undefined tenure status. These areas have been awaiting designation by federal and state governments to some tenure category (e.g., conservation units, rural settlements, military areas, indigenous lands, among others) as determined by law. The current federal administration dismantled a taskforce established during the previous Brazilian government for designating these forestlands. While, governments in Amazon states responsible for their UPF have done little to designate public forests as well. Until designation is made, federal and state governments are uncertain of which official agencies are responsible for managing and protecting of UPF. Thus, they are often powerless to curb illegal deforestation in these public forests. This condition motivated Azevedo-Ramos and Moutinho (2018) to recognize these UPF as “no man's lands”, to highlight the extreme vulnerability of these forests to illegal deforestation and land grabbing. During the final months of the

previous federal administration in 2018, 6 Mha of UPF were designated as protected areas. However, there is still an area roughly the size of France (~ 64 Mha) waiting for designation to a specific land tenure category (CNFP, 2018).

In 2013, Amazon deforestation rates began to increase, reversing a decade long trend of decreasing annual deforestation rates (INPE, 2018). The annual deforestation rate for 2019 was 30 % higher (9700 km² total) than the 2018 rate, reaching its peak since 2012 (INPE, 2018). In this study, we quantify the accumulated illegal deforestation, its associated CO₂ emissions for the 1997–2018 period and the potential illegal occupation within these undesignated Brazilian Amazon public forestlands.

2. Material and methods

Since registered land tenure in the Brazilian Amazon is often unclear, we first evaluated the level of overlap of UPF with already designated public forests (e.g., rural settlements, protected areas, military

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Table 1
Data sources for land use categories used in this study.

Land Tenure category	Database
Indigenous land	FUNAI, 2019
Conservation Unit	MMA, 2019
Public forest*	CNFP, 2018
Private property	SIGEF/INCRA, 2018
Quilombola land	Palmares Foundation, 2018

* the CNFP (2018) includes designated (Indigenous lands, Conservation units, military areas, others) and undesignated forests in federal and state public lands.

areas) and private areas (ex. rural properties; “quilombola” lands – descendants of fugitive slaves from the colonial period; see Table 1 for data sources). We removed the overlaps from the UFP database and analyzed the accumulated illegal deforestation and occupations during the 1997–2018 period.

We measured the illegal deforestation and its related CO₂ emissions within UPF using deforestation polygons provided by the Brazilian monitoring program, PRODES-Amazônia (Deforestation Monitoring of the Brazilian Amazon Rainforest by Satellite) for the period from 1997–2018 (INPE, 2018). We estimate CO₂ emissions from deforestation by multiplying the deforested area (in hectares) by the average carbon density of 132.5 t C ha⁻¹ (Baccini et al., 2012), converted to CO₂ emission using a factor of 3.66.

Additionally, illegal occupations were quantified by identifying the area of “private properties” in the UPF already registered in the Rural Environmental Register system (CAR, in Portuguese acronym; SFB, 2019). CAR is a self-declaratory instrument created in the Brazilian Forest Code (Law 12,651/2012) where property owners must register the georeferenced boundary of their properties, as to enable an environmental assessment of the property (Azevedo et al., 2017). To this end, landowners must register the location and limits of the property and inform the areas of production and conservation (e.g., riverbanks and natural vegetation reserve). However, many people have used CAR registration as a tool to claim legal ownership of the land by registering public lands in their names as private properties (Azevedo et al., 2017; Brito et al., 2019).

3. Results

We find that 9.7 % of the 64.8 Mha of UPF registered in the National Cadaster of Public Forest by 2018 overlapped with the limits of other already designated land categories. The exclusion of overlaps reduced the total area of UPF to 49.8 Mha (32.7 Mha in state owned UPF and 17.1 Mha of federal UPF), indicating that the National Cadaster needs to be urgently revised and updated by the Brazilian government.

Five percent (or 2.6 Mha) of the UPF area (49.8 Mha) had already been deforested for the period from 1997–2018 (Table 2), indicating a continued illegal occupation of these public forests. The estimated carbon emissions from this deforestation was 1.2 Gt CO₂. This amount is equivalent to 60 % of Brazil’s total reported emissions for 2018 (1.9 Gt CO₂; SEEG, 2019). The accumulated deforestation was 5.4 times higher in Amazon federal UPF than state UPF (Table 2).

Table 2
Total accumulated deforestation in Amazon undesignated public forests from 1997–2018.

	Undesignated Public Forests		
	Area (ha)	Deforestation (ha)	(%)
State	32,731,772	413,731	1%
Federal	17,081,444	2,223,044	13%
Total	49,803,205	2,636,775	5 %

Most of the state UPF are concentrated in Amazonas, a state still largely covered by remote forests that are only passively protected. Despite the large area of UPF in Amazonas, only 14 % of the accumulated deforestation occurred in that state. Pará State, however, has 56.5 % of the accumulated deforestation in UPF while Rondônia has 18.8 % of the deforestation (Fig. 1), two states with more trafficable and/or paved main and secondary roads. A large proportion of deforestation in the Brazilian Amazon is concentrated along the roads (Nepstad et al., 2001; Alves, 2002; Vilela et al., 2020).

A total of 11.6 Mha of UPF (23 %; Table 3) have been registered in the CAR system as “private property”, which is forbidden by Brazilian law (Law nº 11.284/2006). Most of these areas (70 %) are in state UPF. Furthermore, 80 % (2.1 Mha) of the total accumulated deforestation in UPF (2.6 Mha, Table 2) occurred in areas with CAR registration (SICAR), indicating the CAR may be being used to legitimize ownership of the land. Since the Brazilian Forest Code (Law 12.651/2012) allows 20 % of properties located in the Amazon to be deforested, if those 11.6 Mha are legalized as private propriety, the potential carbon emission from further legal deforestation would be 1.2 Gt CO₂. In regions where the ecological economic zoning allows 50 % of the properties to be legally deforested, the carbon emission could reach 3.0 Gt CO₂. Furthermore, the illegal occupation of these forests creates a new locus for the growth of land grabbing, illegal exploitation of natural resources and speculation of public lands, significantly increasing the risk for illegal deforestation.

4. Discussion

Land tenure in the Brazilian Amazon is one of the most complex challenges in the region (Brown et al., 2016; Pinto et al., 2019; Stabile et al., 2020). The lack of land tenure security is a source of deforestation, predatory exploitation of natural resources, unsustainable economic activities and violence in the countryside (Fearnside, 2001; Benatti and Cunha Fischer, 2018). The situation may get worse in the coming years. Several authors have already drawn attention to the recent political changes and setbacks in environmental policies in Brazil (Rothkopf, 2018; Tollefson, 2018; Artaxo, 2019). Considering the current governmental weakening of environmental agencies and indigenous land rights; freezing of designation of new public areas; legalization of weapons in rural areas; agribusiness expansion into forestlands, among others, we may see the intensification of land conflicts, rural violence and illegal exploitation of natural resources.

In December 2019, the Brazilian government announced a changed in the land tenure system, facilitating land claims and restricting on-site inspection for cases where there were issues and disputes or for properties over 400 ha. By this new legal instrument (MP 910/2019), the land tenure regularization that was previously for those who occupied land before 2008 was extended to 2014. The MP 910 was not approved by the Brazilian National Congress but was proposed as a bill. The government expects to legalize at least 600,000 properties by 2022. However, what will be done to prevent previous illegal land occupation from becoming legally titled is unclear. By the privatization of public lands through mechanisms historically linked to deforestation in the Amazon region (Fearnside, 2001; Brown et al., 2016; Brito et al., 2019), these actions have the potential to stimulate further land grabs and forest loss especially in UPF.

Our results reveal a wide extension of undesignated public forests in the Brazilian Amazon, which could potentially be contributing to ensure land rights to traditional populations, the maintenance of essential ecosystem services and to attract investments for regional development, is at extreme risk of illegal occupation and deforestation. In 2019, 30 % of the deforestation occurred in UPF (Alencar et al., 2019). Therefore, it is urgent that federal and state governments invest in territorial planning, designation and enforcement of these forest areas, as to resolve land tenure issues, and comply with the Brazilian legal framework (Laws 11.284/2006 and 12.651/2012), while minimizing land

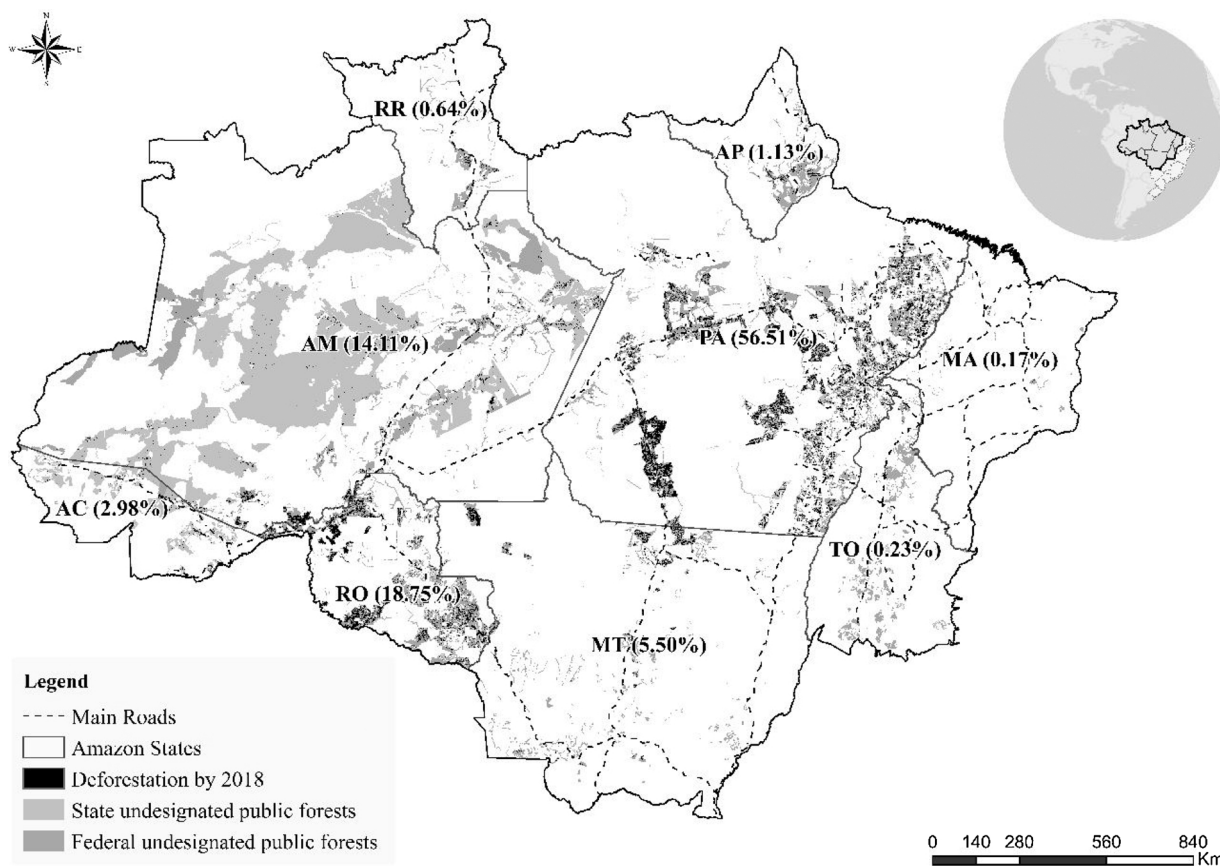


Fig. 1. Percentage of accumulated deforestation (1997-2018) on undesignated public forestlands (UPF) in Brazilian Amazon States: RR = Roraima; AM = Amazonas; AC = Acre; RO = Rondônia; MT = Mato Grosso; TO = Tocantins; MA = Maranhão; PA = Pará; AP = Amapá.

Table 3
The total area of “properties” registered in Rural Environmental Register system (CAR) within undesignated public forests (UPF) in the Brazilian Amazon.

	UPF area (ha)	CAR area (ha) in UPF*	(%)
State	32,731,772 ha	8,040,920 ha	25 %
Federal	17,081,444 ha	3,580,066 ha	21 %
Total	49,803,205 ha	11,620,986 ha	23 %

* Source: SISCAR (SFB, 2019).

conflicts. Otherwise, these forests will continue to be at risk of deforestation and degradation, which may result in an expressive greenhouse gas emissions and negative impacts on ecosystem function. The designation of UPF to some form of conservation may also be crucial to limit the expansion of agriculture and livestock on public forestlands (Stabile et al., 2020).

Most of the data used in this study is from official government sources, therefore these activities are known to the state and federal governments. Although so far powerless to curb illegality, they continue to be responsible for the integrity of Amazon public forests, as declared in the National Constitution and other legal regulations. Brazilian society cannot shy away from demanding compliance with this responsibility to avoid irreparable damage to Amazon socio-environmental assets and global climate. These Amazon assets are being lost to private individuals who evade paying taxes, further burdening the Brazilian state. Finally, illegal deforestation promoted by public land grabbing has an impact on Brazil's reputation and undermines international market confidence in the purchase of agricultural commodities. International pressure can play a significant role in a joint effort to address this issue, as recently seen during the massive illegal forest fires in the Amazon in 2019 (Silvério et al., 2019).

5. Conclusion

Large areas of undesignated public forests are at risk of illegal deforestation and misappropriation in the Brazilian Amazon. This threat is compounded by the easing and weakening of public policies, with potential consequences for land rights and climate change. Brazil may also put at risk its commitment established under the Paris agreement to end the illegal deforestation and associated CO₂ emissions in the Amazon region by 2030. Therefore, it is urgent that UPF must be allocated as protected areas, indigenous lands or designated to sustainable use areas as determined by the law. As since 2019, all programs to designate these areas have been dismantled by state and federal governments, it will be necessary to move forward in reactivating legal procedures to designate UPF. In the meantime, governments will need to use all the legal and punitive instruments available to protect the integrity of these forestlands. If nothing is done, under the current scenario, the Amazon UPF previously called "no man's lands" can quickly evolve into "lawless lands" through the usurpation of natural public heritage.

CRedit authorship contribution statement

Claudia Azevedo-Ramos: Conceptualization, Methodology, Writing - original draft, Writing - review & editing. **Paulo Moutinho:** Conceptualization, Methodology, Writing - original draft, Writing - review & editing. **Vera Laísa da S. Arruda:** Data curation, Formal analysis. **Marcelo C.C. Stabile:** Methodology, Writing - review & editing. **Ane Alencar:** Methodology, Writing - review & editing. **Isabel Castro:** Formal analysis. **João Paulo Ribeiro:** Formal analysis.

Declaration of Competing Interest

None.

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