



Public Forests Under Threat in the Brazilian Amazon: Strategies for Coping Shifts in Environmental Policies and Regulations

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Brazil has 310.5 million hectares of public forests, almost 92% of which in the Amazon. Since the 1980s, Brazilian environmental legislation has been improving and, along with other measures, has contributed to a significant reduction in deforestation in the Amazon since 2005. However, changes in the legal framework and dismantling of successful socio-environmental policies threaten public forests in the Amazon. Here, we highlighted some relevant changes in the legal and political framework and prioritized some actions to safeguard the largest tropical forest in the world considering an adverse political context. We emphasized strategies associated with (1) the institutionalization of practices and processes; and (2) market-driven influence on sustainable production. The purpose is to inhibit current threats until more favorable and participatory circumstances are present and a comprehensive range of past success measures may be revisited.

Keywords: Amazon, environmental policy, deforestation, land grab, legal framework, public forest

INTRODUCTION

Forests cover one-third (4.06 billion ha) of the world's land, with 54% of them concentrated within five countries (FAO and UNEP, 2020). Seventy three percent of world's forests are owned by governments (FAO and UNEP, 2020). About 726 million ha of forest are in protected areas worldwide, with 31% of them in South America (FAO, 2020). Many government-owned forests, however, are effectively shared as common property with local communities or managed as private forest concessions. Therefore, the management model chosen directly impacts forest stocks and benefit distribution (Karsenty, 2016). In a growing scenario of demand for natural resources, biofuels, environmental services and competition for scarce land, pressure on forestlands tend to magnify, and future forest governance will increasingly depend on the complex interaction of multiple actors (state, private and civil society) and on institutional multi-levels (Agrawal et al., 2008; Mwangi and Wardell, 2012; Giessen and Buttoud, 2014).

The stock of global public forests will, therefore, assume unparalleled value as livelihood assets and for mitigating climate change, increasing the responsibility of nations for their conservation. Conservation, restoration, and/or improved land management actions may provide over one third of the cost-effective climate mitigation needed by 2030 to stabilize warming to below 2°C

(Griscom et al., 2017). In developing countries, the reduction of greenhouse gas emissions due to land use change presents their greatest contribution for climate mitigation.

Brazil, one of the five mega-forested countries, has 36% (310.5 Mha) of its territory covered by public forests, with the Brazilian Amazon accounting for almost 92% of these forests (SFB, 2020). Therefore, the fate of the largest continuous tropical forest in the world depends largely on national and state governments. The region, however, has faced marked transformations in its landscape over recent time (Bell et al., 2015; Brown et al., 2016; Dupin et al., 2018) resulting in successive losses of forest cover (INPE, 2020; West and Fearnside, 2021) and forest fragmentation (Kalamandeen et al., 2018; Montibeller et al., 2020). Overall, 33.7 Mha was degraded and 30.8 Mha was deforested between 1992 and 2014 (Matricardi et al., 2020).

Nevertheless, Brazil has a robust environmental legal framework, which is driven by the Federal Constitution of 1988 that treats environment as a common good, and became more comprehensive, scientifically based and punitive (Drummond and Barros-Platiau, 2006). The socio-environmental related legal framework in Brazil had a remarkable advance from 1985 to 2012 (Table 1). In this period, several legislations improved the instruments for the protection of public forests, land rights and legalization of private areas, for instance, the Forest Code; Agrarian Reform Act; National System of Conservation Units; Law of Environmental Crimes (Drummond and Barros-Platiau, 2006; Rajão et al., 2021). This strengthened legal context contributed to Amazon deforestation reduction, and Brazil was globally recognized for its effort for reducing CO₂ emissions after reducing deforestation by 80% from 2005 to 2014 (Carvalho et al., 2019). Several governance measures contributed: law enforcement, remote monitoring systems, restrictions to public credit, and multi-stakeholder agreements, such as beef and soy moratoria (Gibbs et al., 2015; Moutinho et al., 2016; Barreto et al., 2017).

However, the weakening of socio-environmental regulations has been acknowledged as a general global threat (Golden Kroner et al., 2019). In Brazil, the lobby of local and national elites associated to their interests in agribusiness (Carvalho et al., 2019), exploitation of natural resources (Busch and Ferretti-Gallon, 2017), access to land (Brito et al., 2019), the strong political financing by private companies (Fearnside, 2018) and shifting of the political agenda (Abessa et al., 2019) have led to serious setbacks in social and environmental achievements (Pereira et al., 2019), with conspicuous intensification after 2018. The period is in line with the election of the new president of Brazil and the government's anti-socio-environmental agenda (Escobar, 2018; Rothkopf, 2018; Tollefson, 2018). Most of the pressure falls to great extent on the public forests in the Amazon.

The increase in fragility in forest protection produces enormous social and economic liabilities that tend to compromise the rights of traditional communities and to burden future generations with reduced development options (Seixas et al., 2020; Villén-Pérez et al., 2020). Here we highlight relevant and gradual changes in the Brazilian political and legal framework in land rights and environmental conservation observed since 2013, with special implications to Amazon public

forests. We then present suggestions for pragmatic actions in political adverse contexts that may inhibit threats to public forests and safeguard the Amazon forest.

POLICY OPTIONS AND IMPLICATIONS: BRAZILIAN PUBLIC FORESTS AND CHANGES IN LEGAL RULES

Brazilian public forests are classified as (1) *designated forests (DPF)*: with specific destination as conservation units, indigenous lands, rural settlements, military areas, among others; (2) *undesignated forests (UPF)*: not yet with a specific destination; and (3) *vacant lands*: untitled Federal lands (Sparovek et al., 2019; SFB, 2020). According to the National Registry of Public Forests, Brazil has around 285.1 Mha of public forests, of which 223.1 Mha (78%) are designated forests and 62 Mha (22%) as undesignated forests (but see Azevedo-Ramos et al., 2020). The Amazon comprises 92% of the total undesignated Brazilian forests (SFB, 2020) which indicates the importance of protection and management strategies in this region.

The area deforested in the Amazon was 4.3 Mha from 2010 to 2016 (INPE, 2020), with 38.1% in DPF, 33.7% in UPF and vacant lands, and 28.2% in private properties (GRUPO DE TRABALHO PELO DESMATAMENTO ZERO [GTDZ], 2017). That means that three quarters of deforestation occurred in public land. UPF are under greater threat due to lack of territorial planning, land security, forest governance or concrete presence of the State (Azevedo-Ramos and Moutinho, 2018; Azevedo-Ramos et al., 2020). The accumulated deforestation from 2010 to 2015 in UPF in the Amazon resulted in 200 million tCO₂ of greenhouse gas emissions, equivalent to almost 50% of the annual emissions of the Brazilian energy sector (Moutinho et al., 2016).

There was a 96% increase in Amazon deforestation rates between 2013 and 2020 (INPE, 2020), that put Brazil's previous goals for reducing the effects of climate change at risk (Zarin et al., 2016). It was observed a systematic set of initiatives that favored land-grabbing and the flexibility of environmental policies. These initiatives promote deforestation for agricultural purposes or for land speculation, contributing to land concentration (Brito et al., 2019) and the intensification of rural conflicts (Chiavari and Lopes, 2020; Reydon et al., 2020).

For instance, in 2012, the new Brazilian Forest Code—BFC (Law 12,651), which regulates the protection of native forests on private properties, was approved after intense debates in the National Congress and many environmental debts (Soares-Filho et al., 2014). An instrument reinforced in the new BFC was the Rural Environmental Registry – CAR, in the Portuguese acronym (Tollefson, 2012; Azevedo et al., 2017). This tool standardizes the environmental compliance of rural properties through the declaratory and georeferenced registering of native forests and environmental protection areas on the property, followed by later certification by the states. However, it has also been used as a tool for land-grabbing of public lands in the Amazon, when legally non-existent property is registered in the system (Soares-Filho et al., 2014; Moutinho et al., 2016; Azevedo-Ramos et al., 2020).

TABLE 1 | Main regulatory frameworks for environmental protection in Brazil*.

Decade/legal framework	Description	Specific relevance
1980–1990		
Law 6,938/1981	National Environment Policy	Defines mechanisms and instruments to protect the environment
CF/88	Federal Constitution of Brazil	Affirms the right to a healthy environment and as a common good and right of all
1990–2000		
Law 8,629/1993	Agrarian Reform Act	Regulates the principles of land ownership and social function
Law 9.605/1998	Environmental Crimes Act	Imposes penalties on those who commit crimes against the environment
Law 9,985/2000	National System of Conservation Units	Criteria for the creation and management of protected areas
Decree 3.420/2000	National Forest Program	It promotes sectorial public policies for the use and conservation of Brazilian forests
2000–2010		
Law 10,650/2003	Law on public access to environmental information	Public access to existing data and information in environmental agencies
Law 11,284/2006	Public Forest Management Law	Regulates the management and concessions of public forests
Law 11,952/2009	Land tenure of Amazon public lands	Defines conditions for privatization and concession of public areas up to 1,500 ha
Decree 7.029/2009	Environment + Program	Supports environmental regularization of rural properties; creates the Rural Environmental Cadaster
Complementary Law 140/2011	Environmental Licensing Law	Conditions to license activities and undertakings that use potentially polluting environmental resources or can cause environmental degradation
2010–2015		
Law 12,651/2012	New Brazilian Forest Code	Provides for the protection of native vegetation in private properties

*Full legal documents available in <http://www4.planalto.gov.br/legislacao/>.

In 2016, changes in legal rules facilitated the privatization of public areas illegally occupied in the Amazon up to 2,500 ha (MP 276/2016, converted into Law 13,465/2017). A set of successive proposals changed the rules for access to land titling according to the year of land occupation: originally, 2004 (Law 11,952/2009); then, 2011 (Law 13,465/2017); followed by an extension to 2018 (Bill 2,633/2020). According to the latter, land illegally occupied until 2018 could be legalized. This set of changes is understood in rural areas as incentives to encroachments of public lands by capitalized agents (Brito and Barreto, 2020). Indeed, in 2019, Amazon deforestation reached the highest annual rate (10,129 km²) in the last 10 years and 40,000 fire outbreaks were registered (INPE, 2021). Amazon fires are usually associated with land clearing after deforestation for economic or speculative use (Escobar, 2019).

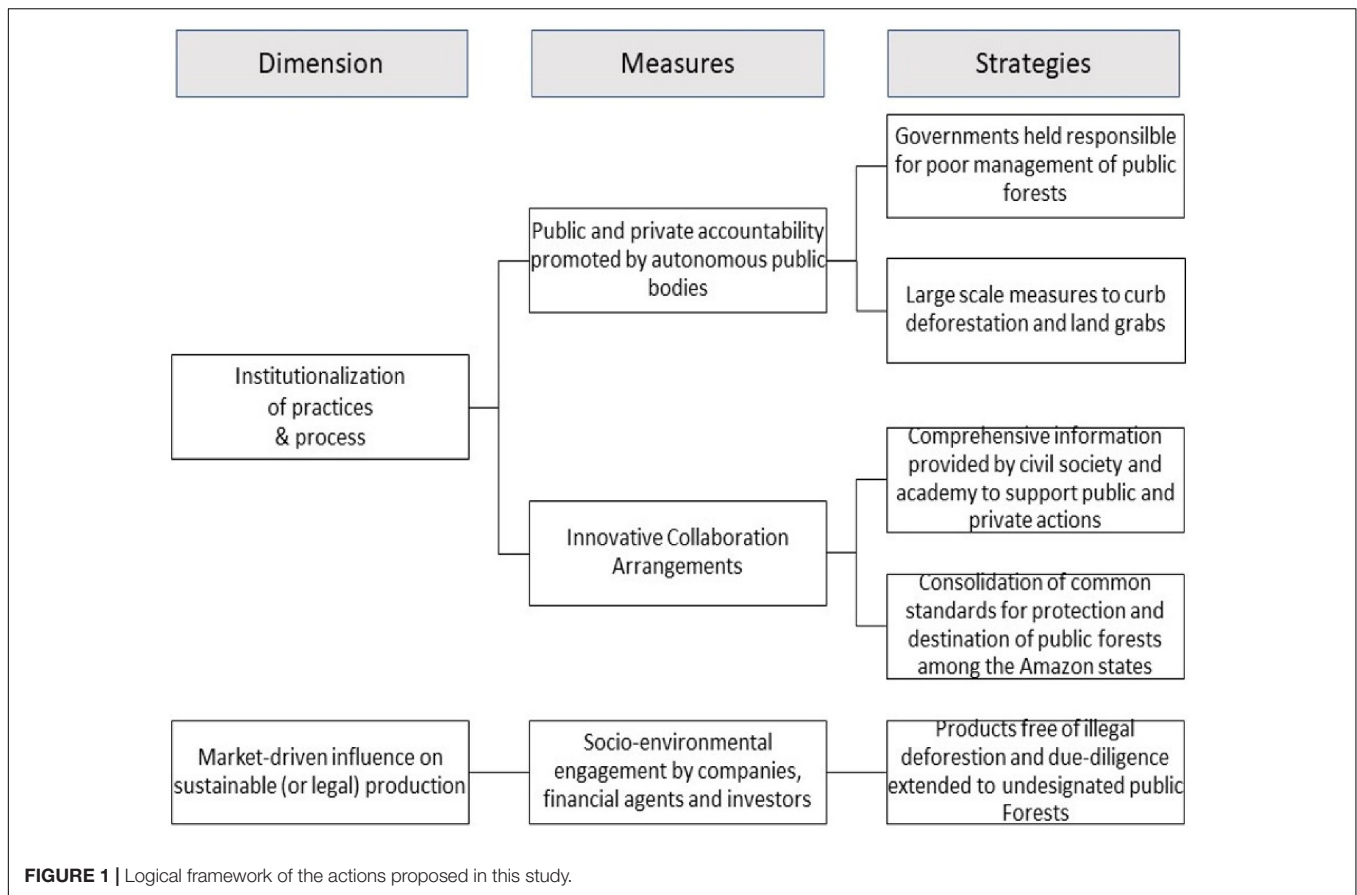
The continuous legalization of land grabs could privatize 19.6 Mha of UPF in the Amazon, causing an additional increase of up to 16,000 km² in deforestation by 2027, emissions of up to 656 million tCO₂ and losses of around US\$ 22 billion for Brazilian society (Brito et al., 2019).

If the UPFs in the Amazon are at greater risk, public forests already designated (DPF) to legal categories are not safe either. As seen, spurious interests in the appropriation of natural resources or land increase the pressure for changes in regulations that protect these forests, including changes in the category of protection, size or land use. For instance, rural settlements designated to small producers remain public lands in Brazil. However, the law 13,465/2017 promoted changes that allow land sale in settlements (Sauer and Leite, 2017). That may result in the violation of rights and a harmful asymmetric relationship due to hierarchical forces interacting across spatial scales (Simmons, 2004; Bennett et al., 2018).

Similar pressures also occur in indigenous lands (I.L.), another DPF. For instance, the Bill 191/2020 proposes the opening of indigenous lands to third parties for mineral extraction, oil and gas, construction of hydroelectric dams, cattle farms and agribusiness, without veto rights by indigenous peoples (Ferrante and Fearnside, 2020; Villén-Pérez et al., 2020). It is an explicit violation of the rights of indigenous peoples guaranteed in Convention 169 of the International Labor Organization, which requires free, prior and informed consultation of the affected indigenous peoples. I.L. protect 24% of the Brazilian Amazon region and more than 400 thousand indigenous people, acting as a protection shield to one of the largest carbon stocks in the world. Their devastation poses a risk to the entire planet (Ferrante and Fearnside, 2020).

Another DPF, Conservation Units protect 18% of the Brazilian Amazon (Brito and Barreto, 2020) and is also affected by changes in regulations that may result in protected area (PA) downgrading, downsizing, and degazettement (PADDD). In Brazil, 93 PADDD events were identified from 1981 to 2012, comprising an area of approximately 7.3 Mha of PA (Bernard et al., 2014). A recent report provides specific examples within the Amazon region (WWF, 2019). Attempts at changes were incorporated by MP 758/2016, MP 756/2016 (both unsuccessful) and Bill 6024/2019, which affected the limits and category of protection of PA in Central and Western Amazon (Machado et al., 2020). The consequences have impacts on land speculation and the expansion of the agricultural frontier in the region.

The endeavor to change the rules governing public forests was intensified after 2016 in the context of the Brazilian political-economic crisis since 2014 (Costa et al., 2017), and worsened after the change of the Brazil's central administration in 2018. In Brazil, 57 legislative acts that weakened environmental legislation were enacted between 2019 and 2020 (Vale et al., 2021). The dismantling of Brazilian environmental policies caused regulatory changes, institutional weakening, budget cuts and political interference in socio-environmental agencies (Tollefson, 2018; Ferrante and Fearnside, 2019). Although transformation is still ongoing, the shifts in policies and practices tend to what was conventionally called “regulatory capture,” when regulation is directed away from the public interest toward the interests of



the regulated industry (Carpenter and Moss, 2013, p. 73). Similar shift was also recently observed in United States (Bomberg, 2017; Dillon et al., 2018). Whether the loosening of protection for Brazilian public forests will last, will depend on the launch of preventive measures.

ACTIONABLE RECOMMENDATIONS

In a recent past, Brazil has been very efficient in protecting its public forests and reducing deforestation in the Amazon, demonstrating that it has a well-established framework of programs and policies to put into practice when needed (Assunção et al., 2013, 2015; Moutinho et al., 2016). However, the use of some measures, such as command and control, although needed, may be challenging in the current political scenario of intense dismantling of environmental policies and agencies, and unhealthy politician-private sector relationships (Garcia et al., 2017; Abessa et al., 2019; Pereira et al., 2020). To avoid further damage until past socio-environmental achievements can be restored, we suggest prioritizing some measures based on two core, interrelated and complementary dimensions: (1) the institutionalization of practices and processes to consolidate stability and legitimacy; and (2) market-driven influence on sustainable production (Figure 1). The first would focus on strategies associated with private and public accountability by

autonomous bodies and innovative collaboration arrangements. And the later would focus on the role of companies, financial agents and investors in “greener” production and trade. The strategies are detailed below.

Accountability for non-compliance with regulations is straight-forward and inhibits new crimes. Public and private accountability, therefore, is crucial to breaking the vicious cycle of land grabs and deforestation of Amazon public lands. The use of checks and balances in democracies (right to mutual control and influence) contributes so that different powers (legislative, judicial and executive) interact in an equitable and balanced way, providing stability. In a supplementary manner, some autonomous bodies have the function of inspecting undue and disproportionate State interference in the lives of citizens, as well as its policies, when they interfere in the public interest. Fundamental rights are also foreseen in the Brazilian Constitution, such as negative status rights (allow resistance to State action); rights to benefits (allow individuals to demand action by the State in order to improve their quality of life); and collective rights (such as the environment, economic development, solidarity, respect for the public interest). Thus, autonomous institutions (e.g., General Accounting Office; Public Prosecutor’s Office) may be protagonists in the process of holding the State accountable for any failure to fulfill its role in protecting the natural heritage and promoting the socio-environmental development of public forests in the Amazon.

So far, some welcome initiatives to curb Amazon deforestation (e.g., Protection the Amazon Project by the Public Prosecutor's Office) or to improve PA management (e.g., Coordinated Audit in Amazon Conservation Units by the General Accounting Office) illustrate the possibilities although it may lack the scale, permanency and inter-institutional collaboration in some cases. Rarer, but needed, are coordinated initiatives against federal or state government mismanagement. In this sense, autonomous bodies may stimulate the judiciary in cases in favor of public forest protection that cause uniformity of jurisprudence, and therefore, stability. Similar measures may be also taken at the sub-national level.

Likewise, private entities also need to be held responsible for potential damage to public forests. The Rural Environmental Registry (CAR), an instrument of environmental regularity of private properties, but misused as a mechanism for legitimizing possession in the Amazon, can be used to identify land grabbers and deforesters through their declared personal data. Public access to these data, currently absent, would also increase social control. A second measure may be the inclusion of all public (designated and undesignated) forests in the National System of Rural Environmental Registry – SISCAR. This would allow the immediate cancelation of overlapping records with public forests (except in cases provided for by law, e.g., legitimate possessions of smallholders) and consequent proportional penalties to the applicant. As registration is an ongoing process, new records of alleged properties in public forests would be automatically prevented from being registered (exceptions analyzed separately). A total of 11.6 Mha of UPF have already been illegally registered as private property (Azevedo-Ramos et al., 2020). Many may be associated with the practices of financing deforestation by political and economic elites in the Amazon (Brondízio et al., 2009). The correction would be to remove millions of false records from the system and facilitate the validation by the states, currently delayed, of legal records.

In troubled times, innovative collaboration arrangements may be key. Institutions may benefit from partnerships with civil society and scientific organizations for information and data. Brazilian society has been keen to come together and provide socio-environmental raw data in organized and georeferenced platforms (e.g., MapBiomass; Sparovek et al., 2019). A consortium for systematic analysis and reporting by scientists for decision makers would also be important to bring confidence to the results and suggestions. In the public sphere, coalitions at the sub-national level (e.g., Consortium of Amazon States) have occurred in reaction to central government policies. As many public forests belong to the states, it would be advantageous if the Amazon states could agree on common standards for the protection and destination of public forests, with scale and collaboration gains. The strengthening of their land and environmental agencies would also be a counterpoint to the current movement in the opposite direction in the federal level, minimizing the damage.

A market-driven influence on sustainable (or legal) production is highly relevant not only to pressure the government but to align the market to new sustainable paradigms. In this sense, companies, finance agencies as well as investors are important players. Several companies (Mongabay, 2020),

national financial agents (DW, 2020) and international investors (Financial Times, 2020) recently highlighted to the Brazilian government the importance of the conservation of the region, also presenting policy changes of their own processes in favor of sustainability. The three largest private banks operating in Brazil have released an integrated plan to contribute to sustainable development of the forest and guarantee basic rights for the people of the Amazon, with differentiated financing for zero deforestation. Global funds that manage US\$ 4.5 trillion have put pressure on the Brazilian government to reduce deforestation, threatening to stop investing in the country. Transnational companies in the agricultural, industrial, mining and service sectors ($n = 38$), along with four major business associations urged Brazil to address environmental crimes in the Amazon. Changes in the processes of production and purchase are also highly relevant. In this sense, expanding the tracking and due diligence processes also for the UPF would avoid the spillover effects of products originating in untitled land or with illegal deforestation. Importers engaged in these measures could benefit from trade with countries with restrictive policies for non-sustainable or illegal products.

Transparency is transversal and key to all processes, as well as participation, vigilance and conscious buying practices by society. We recognize that several other strategies are needed to curb deforestation and land grabs and to promote sustainable activities and the well-being in the Brazilian Amazon. Here we prioritized some possibilities in the current political context, taking advantage of some ongoing actions and emphasizing what is lacking and may be included.

CONCLUSION

Changes in Brazilian environmental policies, regulations, and institutions, intensified by the current central administration, have serious consequences for the protection of Brazilian public forests. Here, we suggest possible strategies to be implemented in an adverse political situation guided by the lack of political will to reissue previous successful measures (or any other) to tackle deforestation and land grabs. We focused on two main dimensions, each with its specific strategies: (1) the institutionalization of practices and processes; and (2) market-driven influence on sustainable production. These measures aim to reduce conflicts and land speculation in public forests and to safeguard the Amazon forest so that sustainable development models can evolve in a near future.

AUTHOR CONTRIBUTIONS

IM and CA-R: ideation. IM, CA-R, and JP: conceptualization, writing original draft, writing review, and editing. All authors contributed to the article and approved the submitted version.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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