

Contemporary Quantitative Analysis of Events Such as Downgrading, Resizing and Declassification of Federalized Protected Areas in Brazil

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Received: April 22, 2022 Accepted: June 6, 2022 Published: June 22, 2022

doi:10.5296/ijgs.v6i1.19996 URL: <https://doi.org/10.5296/ijgs.v6i1.19996>

Abstract

This paper presents a contemporary analytical and quantitative study of protected area downgrading, downsizing, and degazettement-type events of federalized protected areas in Brazil. In view of its continental dimensions, it has faced strong pressures to build sustainable conservation standards, which culminated in a long and brilliant process of updating and perfecting its environmental legislation, considered one of the most modern in the world. However, due to the whims of the capitalist system, Brazil had to relinquish land within environmental preservation areas so road and hydroelectric infrastructure systems could be expanded to better serve the population. Faced with this scenario, some critical questions arise: how did the “Conservation Units” (UC’s) in Brazil originate? How many of these UCs are under federal governance? How many protected area downgrading, downsizing, and

degazettement (PADDD) events of conservation areas have affected or influenced federal UCs? What are the primary provocative tendencies of these PADDD events? What can be suggested to minimize the effects of PADDD events on the existing UCs in the Brazilian territory? Employing bibliographic surveys and analysis of data related to the PADDD events in Brazil and on the federal UCs, provided by institutes involved in environmental preservation, we will arrive at the most satisfactory and coherent answers to the aforementioned questions.

Keywords: Protected Areas. Brazil. PADDD. Federal Government.

1. Introduction

The creation of nature preservation and conservation areas, under coordination by the federal government, increased as new federal environmental laws were passed. Over the years, Brazil has increasingly adopted the idea of nature protection, culminating with the promulgation on July 18, 2000 of Law 9.985. This set of norms came to regulate article 225, § 1, clauses I, II, III and VII of the 1988 Federal Constitution, and to institute the National System of Nature Conservation Units.

According to the Socio-environmental Institute, in 2018, there were 151 fully protected federal conservation units, which corresponded to about 50,596,214 hectares (ha), and 185 sustainable use federal conservation units, which corresponds to 115,589,811 ha. Together, these conservation units total 336 areas and are equivalent to 19.5% of the national territory.

However, due to the whims of the capitalist system, Brazil had to cede space within the environmental preservation areas so road and hydroelectric infrastructure systems could be expanded to better serve the population. Faced with this scenario, the central issues to be investigated become clearer: how did the UCs in Brazil come about? How many of these UCs are under the governance of the federal government? How many protected area downgrading, downsizing, and degazettement (PADDD) events have affected or influenced federal UCs? What are the primary provocative tendencies of these PADDD events? What can be suggested to minimize the effects of PADDD events on the existing UCs in the Brazilian territory?

In the period from 1900 to 2014, 67 PADDD events were enacted and another 60 were proposed, totaling 127 events that affected about 91,494 km² of area. Of these, 69 were events that reduced protected areas. The above data also clearly establishes that the most affected biome was that of the Amazon, where 48 events were enacted and 29 were proposed, totaling 77 and affecting a total area of 261,663 km². As for the primary causes that contributed to such events, the main one was the development of the country's hydroelectric infrastructure, which was responsible for the enactment of 26 events and the proposal of two others, totaling 28 and affecting an area of 16,775 km².

The great scientific and social relevance of the theme lies in: (a) understanding the process of federalization of protected areas in Brazil; and (b) analyzing data obtained about the Brazilian protected areas and about the PADDD-type events that occur in these federal UCs, as well as the realization of other studies in the area of environmental preservation and environmental social policies, having as a target audience the students of higher education courses related to environmental themes and of graduate and specialization courses focused on the study of nature

and of the means of its conservation and protection, the professionals in the area of natural sciences, and society in general.

By means of bibliographic surveys and analysis of data related to PADD events in Brazil and the quantity and types of Federal UCs, as made public by institutes linked to environmental preservation, we will arrive at the most satisfactory and coherent answers to the aforementioned considerations.

2. Contemporary Quantitative Analysis of Downgrading, Resizing and Declassification Events in Federalized Protected Areas in Brazil

2.1 The protected areas in Brazil and their genesis

Brazil has a large number of protected areas in different modalities recognized by environmental legislation, such as permanent preservation areas (APP), legal reserves (RL), and conservation units (CU). The creation of these areas serves as a way to protect the Amazon rainforest from undue logging and deforestation and to have it declared under the legal protection of the Brazilian State, i.e. to create a conservation unit. This establishment process can be considered an important strategy for managing the territory, as it establishes limits and dynamics for specific uses and occupations; noteworthy is that this control and these use criteria that are normally applied to these areas are often attributed to the valorization of the natural resources existing in them or, still, to the need to safeguard biomes, ecosystems, and rare or endangered species (Medeiros, 2005, p. 41).

However, Brazil was one of the countries that most belatedly succumbed to the international trend of park creation, after the USA's initiative in 1872. However, historical records suggest both the Portuguese crown and the imperial government undertook some initial actions aimed at the protection, management, or control of certain natural resources. For example, the first measures aimed at the protection of areas or resources in Brazilian lands have records dating to the colonial period, being their prime objective to ensure the control over the management of specific resources, such as wood or water, as already practiced in some parts of Europe. (Medeiros, 2005, p. 43).

1605's "Regimento do Pau-Brasil" is one of the first Brazilian forest protection laws and established strict limits on the practice of brazilwood exploitation in the colony. This was followed by the 1797 Royal Charter, which aimed to curb the unauthorized logging of certain species of trees whose wood, considered noble (cedar, mahogany, etc.), represented an important resource for the metropolis. (Medeiros, 2005, p. 43).

All the instruments adopted by both the Portuguese metropolis and, later, the Empire had their focus of protection essentially centered on certain natural resources without necessarily having the demarcation of specific areas or territories. (Medeiros, 2005, p. 44).

According to Costa (2003, as cited by Medeiros, 2005, p. 5), in 1911, Brazilian scientist Luís Felipe Gonzaga de Campos published the "Forest Map of Brazil", the first domestic comprehensive study to detail the country's different biomes and their states of conservation, with the express intention of subsidizing the Brazilian authorities for the creation of a set of

national parks. The Brazilian Republic had a set of rather fragile institutions and instruments dominated by the rural elites, which were not sufficient to guarantee the continuity of such an ambitious project of creating areas with special regimes of protection due to their natural resources. (Medeiros, 2005, p. 45).

Legally, however, the first notion of APPs appeared with the first Brazilian Forest Code, Federal Decree No. 23,793, of January 23, 1934 (Marenzi and Longareti, 2018, p. 315). These forests were considered of perennial and inalienable conservation, and it became strictly forbidden to cut down “the forests still existing on the banks of water courses and lakes,” as told in Article 22 of the decree.

Several factors converged to create a political and institutional environment favorable to such changes regarding the creation of federal norms that would protect Brazil's natural resources. The influence and pressure from organized movements focused on the protection of nature, which were starting to become better equipped, as well as the need to reorganize forest exploitation established important references for the construction of a new environmental policy. Another preponderant factor was the construction of a new political project for the country, which posited modernization and the search for greater international insertion as its main orientation. (Medeiros, 2005, p. 46).

In the Constitution of the Federative Republic of Brazil of 1934, the protection of nature, for the first time, figured as a fundamental principle to which the Union and the States should contribute. (Medeiros, 2005, p. 46). Thus, nature began to encompass a new value, that is, it was considered an admirable national heritage to be preserved. In turn, its protection acquired new meaning and status, consisting of a task or duty to be performed and supervised by the Public Power. (Medeiros, 2005, p. 50).

The period between 1934 and 1965 was mainly characterized by bringing into Brazilian legislation the first elements capable of guaranteeing a differentiated regime of protection and management of portions of the Brazilian territory, although this was not reflected expressively in the number of instituted areas. (Medeiros, 2005, p. 51)

In the second Forest Code, established by Federal Law No. 4.771 from November 15, 1965, the legal figure of “Permanent Preservation Area” was created, which, according to Article 1 of this compendium of environmental legislation, would be a protected area, covered or not by native vegetation, with the environmental function of preserving water resources, landscapes, geological stability, and biodiversity, of facilitating fauna and flora gene flow, of protecting the soil, and of ensuring the welfare of human population; in sum, its objectives followed the same line as its predecessor. However, it abolished the four types of protected areas previously provided in the 1934 version, replacing them with four new ones: National Park, National Forest, Areas of Permanent Preservation (APPs), and Legal Reserves (RLs) (Medeiros, 2005, p. 52).

The new Law for the Protection of Animals (Law no. 5,197/1967) guaranteed animals the right to protection in their native environments and the creation of specific spaces – refuges and reserves – destined to their preservation, in addition to others specific to hunting. Thus, the

government became responsible for creating the National Biological Reserves and the Federal Hunting Parks. (Medeiros, 2005, p. 52).

In 1967, through Federal Law Decree no. 289 and with the objective of implementing, managing, and inspecting the protected areas that were expanding rapidly in Brazil, the Brazilian Institute for Forest Development (IBDF) was created, a federal agency linked to the Ministry of Agriculture. Its primary competence was to enforce the Forest Code, the fauna protection law, and all legislation pertaining to renewable natural resources, in addition to managing all protected areas in the country.

In 1973, through Decree nº 73.030, the Environment Special Secretariat (SEMA) was created, as part of the Ministry of the Interior, and began to share with IBDF the responsibility for the management and supervision of the Brazilian policy for protected areas. (Medeiros, 2005, p. 53). SEMA proposed the creation of four more protected areas: Ecological Stations (ESEC), Environmental Protection Areas (APA), Ecological Reserves (RESEC), and Areas of Relevant Ecological Interest (ARIE). (Medeiros, 2005, p. 54).

The category of Environmental Protection Area (APA), appearing in the Brazilian legal system in the early 1980s, was innovative for being the first category of protected area in national law to allow the allocation of private lands, and the subsequent permanence of resident populations, and to seek the conciliation of the economic activities and interests of these populations with the conservation of natural elements. Although this is not the first Brazilian model of protected area to pursue this integration, it is undoubtedly an innovative category, as it introduced into the national legal system the first traces of a trend that is currently present in most countries' rights: inhabited protected areas with a clear concern for local economic development. (Leite, 2015, p. 77).

In 1996, the Private Natural Heritage Reserves (RPPNs) were created, a new typology that allowed the recognition of a protected area in the private domain, which allowed and stimulated the voluntary creation of protected areas by society. (Medeiros, 2005, p. 54).

Continuing the development of public policies aimed at the creation of environmental protection and preservation areas, the National System of Nature Conservation Units (SNUC) was created in 2000. Its main objective was to outline more specific criteria for the creation and management of some categories of protected areas that were previously scattered among different legal instruments. This system served to not only incorporate a considerable portion of the protected areas provided by Brazilian legislation until then, but also to give way to the creation or incorporation of new categories based on original experiences developed in the country. To highlight the progress that had occurred regarding the creation of protected areas, especially after the establishment of the SNUC, by 2005 Brazil possessed 682 Federal UCs, corresponding to an extension of 61,875,888.68 hectares of land.

However, the SNUC did not fully achieve its objective of integrating the creation and management of the distinct existing typologies in the country by means of a single instrument; the existing division, for example, between the different typologies of protected areas that were excluded from its text increased, while the other categories that remained after the SNUC's

creation – the APPs, the RLs, the Tis, and the ARIs – remained plagued by the same historical management problems and were not provided the instruments of integration and articulation that were planned to carry out the measures regarding the Conservation Units. Nevertheless, the SNUC was capable of recognizing that the actions would only be more effective if they were organized in an integrated and systematic manner.

On May 25, 2012, Law No. 12,651, entitled the New Environmental Code, which repealed Federal Law No. 4,771/1965, came into force. From then on, there were some changes regarding the

conditions for the limits of Permanent Preservation Areas.

In 2014, the UN released the newest version of its list of protected areas, with information on more than 209 thousand areas in 193 countries covering more than 32 million km. In 2014, Brazil possessed 1,810 protected areas covering 2,426,789.75 km² of land and 58.309.14 km² of marine areas, which corresponds to 20.37% of the national territory, ranked third in the world in this respect.

2.2 The federalized environmental preservation areas in Brazil

The creation of preservation and conservation areas, under the coordination of the federal government, increased as new federal environmental laws were passed. Over the years, Brazil has increasingly adopted the idea of nature protection, culminating with the promulgation of Law 9.985 on July 18, 2000. This set of norms came to regulate article 225, § 1º, clauses I, II, III and VII of the Federal Constitution of 1988, and to institute the National System of Nature Conservation Units and other provisions. Article 2, clause I of the law states:

“conservation unit: territorial space and its environmental resources, including jurisdictional waters, with relevant natural characteristics, legally established by the Public Power, with conservation objectives and defined limits, under a special administration regime, to which adequate protection guarantees apply”.

According to article 7 of the aforementioned law, these federal conservation units can be divided into two groups: (1) fully protected areas, in which nature is to be totally protected from human interference and ecosystems are to be maintained free of alterations caused by humans, with only the indirect use of the six natural attributes being admitted (art. 2, clause VI of Law 9.985/2000) and (2) areas of sustainable use in which human may interact with nature in an economically sustainable way, that is, conservation units where the environment is exploited in a way that guarantees the continuity of renewable environmental resources and ecological processes and that maintains the biodiversity and other ecological attributes in a socially fair and economically viable manner (art. 2º, clause XI, of Law 9.985/2000).

In table 01 below, we outline the total number of conservation units under the responsibility of the federal government, divided into Full Protection Units (UPI) and Sustainable Use Units (UUS).

Table 1. Number of Federal Conservation Units by Category In Brazil:

Category	Quantity	Official Area (ha)	% of the Area in Relation to the Total Area of CUs	% of the Official Area in relation to the area Brazil
Integral Protection				
ESEC	32	7,483,266	4.503	0.879
MONAT	5	11,686,588	7.032	1.372
PARNA	74	26,788,073	16.119	3.146
REBIO	31	4,339,346	2.611	0.510
RVS	9	298,941	0.180	0.035
Total Integral Protection (Federal)	151	50,596,214	30.446	5.942
Sustainable Use				
APA	37	84,791,692	51.022	9.958
ARIE	13	35,488	0.021	0.004
FLONA	67	17,186,559	10.342	2.018
RDS	2	102,912	0.062	0.012
RESEX	66	13,473,160	8.107	1.582
Total Sustainable Use (Federal)	185	115,589,811	69.554	13.574
General Total (Federal)	336	166,186,025	100.000	19.5

We considered the official extensions mentioned in the legal instruments that created or altered the area of the Brazilian Conservation Units, not discounting any overlaps with protected areas (Conservation Units, ITs, TQs). The maritime areas are included.

SOURCE: Instituto Socioambiental - Protected Areas System (SisArp) - 03/28/2021

In 2018, there were 151 fully protected federal conservation units, which corresponded to about 50,596,214 ha. The number of federal conservation units for sustainable use was 185, corresponding to 115,589,811 ha. Together, these conservation units total 336 areas and are equivalent to 19.5% of the national territory. (TABLE 1).

Distributing among the federative units of the country, the greatest concentration of the federal conservation units lie in the northern region.

Table 2. Number of Federal Conservation Units in Brazil Per Federation Unit:

UF	Qty Sustainable Use UCs	Qty Full Protection UCs
Acre	9	2
Alagoas	1	3
Amapá	2	5
Amazon	24	16
Bahia	6	21
Ceará	4	4
Federal District	2	2
Espirito Santo	3	8
Goiás	4	3
Maranhão	9	4
Mato Grosso	0	7
Mato Grosso do Sul	0	3
Minas Gerais	4	10
Pará	38	10
Paraíba	3	1
Paraná	3	12
Pernambuco	2	5
Piauí	2	5
Rio de Janeiro	3	11
Rio Grande do Norte	2	3
Rio Grande do Sul	3	6
Rondônia	7	7
Roraima	3	6
Santa Catarina	6	8
São Paulo	10	5
Sergipe	1	3
Tocantins	1	3

The official extensions cited in the legal instruments of creation or alteration of the area of UCs in Brazil were considered, not discounting any overlaps with protected areas (UCs, ITs, TQs). The maritime areas are contemplated UCs incident in more than one unit of the federation, are computed in each one of the occurrences, thus the simple sum does not reflect the total number of existing UCs. The UCs of the category APA - Environmental Protection Area - are not included in this calculation.

SOURCE: Instituto Socioambiental - Protected Areas System (SisArp) - 03/28/2021.

The states of Pará and of Amazonas contain the most federal conservation units, with 48 and 40, respectively. On the other hand, the state of Mato Grosso do Sul has only 3 full protection federal conservation units (TABLE 2).

Table 3. Federal Conservation Units (Cus) In Brazil by Biome

Biome	Qty Sustainable Use UCs	Total Sustainable Use Area (ha)	Qty Full Protection UCs	Total Integral Protection Area (ha)
Amazon	87	30,156,044	42	31,471,303
Caatinga	7	55,082	17	1,146,955
Cerrado	18	140,500	22	4,569,946
Atlantic Forest	35	112,907	52	1,188,546
Pampa	0	0	2	68,866
Pantanal	0	0	2	147,773
Coastal and Maritime Zone	25	982,806	21	12,132,469

We considered the official extensions mentioned in the legal instruments of creation or change of area of the UCs in Brazil, not discounting any overlaps with protected areas (UCs, ITs, TQs). Maritime areas are included. The UCs occurring in more than one biome are computed in each of the biome occurrences, thus the simple sum does not reflect the total number of existing UCs. The UCs of the category APA - Environmental Protection Area - are not included in this calculation.

SOURCE: Instituto Socioambiental - Protected Areas System (SisArp) - 03/28/2021. According to the cartographic base of protected areas produced by ISA and the biomes base of the Brazilian Institute of Geography and Statistics (IBGE) - Ministry of Planning, Budget and Management (Scale 1:5,000,000).

The Conservation Units can be categorized by biomes, as shown in TABLE 3. The most units are present in the Amazon biome, which houses 87 conservation units for sustainable use and 42 for full protection areas, totaling 129 protection areas. Conversely, the Pantanal and the Pampa biomes contain only two full protection units each. The coastal and marine biome has 46 protected areas, of which 25 are sustainable use CUs and 21 are full protection areas.

The section below explores the trend of numerous PADDD-type events that have been occurring in Brazil, especially since 2010, understood as effective or propositional processes that lead to the reduction, recategorization, or even extinction of Conservation Units.

2.3 Events of downgrading, resizing and declassification of federal protected areas in Brazil

Protected areas (PAs) are a pillar of biodiversity conservation. Brazil, home to one-third of the world's tropical forests and 12% of its PAs, is a global leader in the creation and management of PAs. Despite this leadership, there is evidence to suggest Brazil is reducing elements of its Protected Areas network through a process known as PA declassification, reduction, and declassification (PADDD) (Pack *et al*, 2016, p. 5)

According to data released by WWF-Brazil in 2019, the country has evolved substantially since 1970 in relation to the creation of protected areas, having, in 2018, about 18.4% of its continental territory covered by numerous PAs, and can be considered one of the nations that most assisted in the global dissemination of this government policy of nature protection, taking into account the decade of the 2000s. However, since 2008 Brazil has suffered an increase in PADDD events to a level unprecedented in its history as a sovereign nation.

According to Pack *et al* (2016, p. 5), the first Brazilian enacted PADD type event occurred in 1971, when President Emílio Médici signed Decree 68,873, which reduced Araguaia National Park without citing a reason for the legal change; this decree reduced Araguaia National Park to only 33% of its original size.

To underscore the extent of this process, a study published in *Biological Conservation* in 2016 compiled the PADD events that occurred in Brazil from 1900 to 2014. In this period, 67 PADD events that covered an area of 110,000 sq km were carried out and these showed a higher frequency during the late 2000s. The main basis for this change was, according to the study, power generation and rural settlements. Protected areas covering more than 70,000 sq km were also considered by the authors to be at risk of reduction or declassification (WWF-Brazil, 2019, p. 7).

		Enacted PADD		Proposed PADD			All PADD		
		No. of events	Area affected (km ²)	No. of events	Area affected (km ²)	No. of events	Area affected (km ²)	No. of events	Area affected (km ²)
Event type	Downgrade	9	16,713	9	11,573	6	1970	24	30,258
	Downsize	43	81,088	15	7109	12	3296	69	91,494
	Degazette	15	14,676	3	53,445	15	105,226	33	173,347
All PADD		67	112,477	27	72,128	33	110,492	127	295,099
Biome	Amazon	48	88,341	10	65,715	19	107,607	77	261,663
	Atlantic Forest	5	601	6	41	5	426	16	1067
	Caatinga	1	34	-	-	-	-	1	34
	Cerrado	13	23,500	9	6196	6	2353	26	32,049
	Marine-Coastal	-	-	2	176	3	108	5	283
Primary cause	Contested legality	-	-	1	13,011	12	93,244	13	106,256
	Hydropower infrastructure	26	16,775	1	0	1	-	28	16,775
	Industrial agriculture	2	337	1	23,694	-	-	3	24,031
	Land claims	10	46,759	3	566	4	10,885	16	61,011
	Rural settlements	14	7243	9	27,906	8	2763	31	40,228
	Unknown	9	26,288	-	-	2	3228	11	29,516

Figure 1. Addresses the frequency, spatial extent, location, and immediate cause of realized and proposed PADD events in Brazil.

Source: Adapted from Pack et al (2016).

Figure 01, adapted from Pack et al. (2016), conveys that in the period from 1900 to 2014, 67 PADD events were enacted and another 60 were proposed, totaling 127 events that affected an area of 91,494 km². Of this total, 69 were events that reduced protected areas. As for the most affected biome, the Amazon was the clear leader, a target of 48 of the enacted and 29 of the proposed events, totaling 77 events that encompass an area of 261,663 km². One of the primary causes that contributed to such events was the development of the country's hydroelectric infrastructure, which was responsible for 28 total events that affected an area of 16,775 km².

In light of the discussed evidence, a couple of key concerns arise: (a) what led to the increase in the number of PADD events in the Brazilian territory; and (b) what led to a retreat of governmental authorities in implementing public policies of incentives for the creation of protected areas?

According to WWF-Brazil's 2019 report "PADD Trends in Brazilian Amazon Protected Areas — Mapping the risk of protected area downgrade, resize and degazettement in the biome", the answer to the above questions are twofold: (1) pressure from the agribusiness

and mining sectors; and (2) pressure from “grileiros”, illegal land occupants or land grabbers, and their agents in the legislative branch.

According to Brazil’s PADD tracker platform, in the thirty years between 1988 and 2018, there have been 46 PADD events in the Amazon alone, and another 29 potential events have been proposed which, if successful, will cover a total area of more than 190,000 sq km. In these cases, the average “useful life” of the PAs affected by PADD, from their creation to the proposed intervention, is eight years. In many of the areas, the proposal for a PADD legal instrument occurred in the same year as its creation (WWF-Brazil, 2019, p.12).

The “lifetime” of the PAs affected by the PADD events, considering the time from the creation of the areas until their downgrading, resizing or declassification was, on average, 15 years.

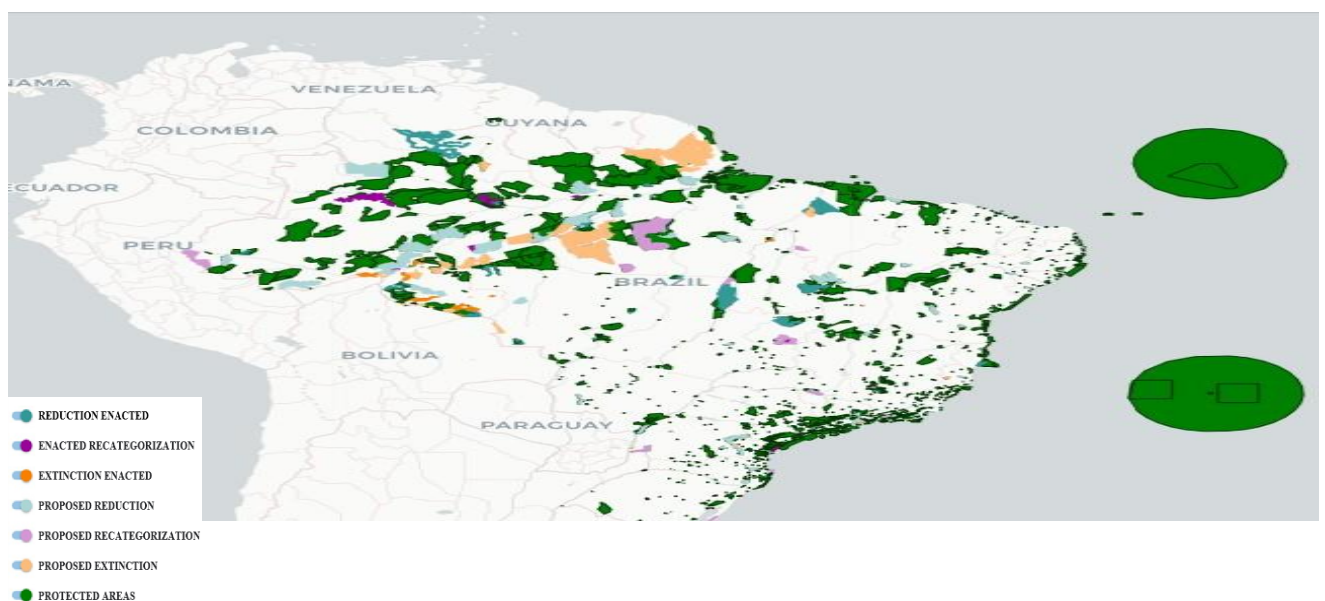


Figure 2. Proposed PADD events in Brazil.

Source: Adapted from the WWF - Brazil website (<https://plataforma.paddbrasil.org.br/>).

In the figure above, we have the distribution of protected areas in the Brazilian territory, as well as the distribution of proposals for downsizing, resizing or declassification. From its analysis, we infer that the proposals for reduction and extinction are the most common. On the other hand, extinctions that have been enacted are, so far, the least numerous events.

Name of PA	Level	STATE	Type	Date of Creation	Date of Proposed PADDD
TAPAJÓS ENVIRONMENTAL PROTECTION AREA	Federal	PA	Degazettement	2006	2006
TERRA DO MEIO ECOLOGICAL STATION	Federal	PA	Downgrading	2005	2006
			Downsizing	2005	2006
AMAPÁ STATE FOREST	State	AP	Degazettement	2006	2013
ANAUAÍ NATIONAL FOREST	Federal	RR	Degazettement	2005	2005
BOM FUTURO NATIONAL FOREST	Federal		Degazettement	1988	2009
			Degazettement	1998	2008
			Downsizing	1988	2000
RORAIMA NATIONAL FOREST	Federal	RR	Downsizing	1989	2005
AMANÁ NATIONAL FOREST	Federal	PA	Degazettement	2006	2006
CREPORI NATIONAL FOREST	Federal	PA	Degazettement	2006	2006
JAMANXIM FNATIONAL FOREST	Federal	PA	Degazettement	2006	2008
			Degazettement	2006	2006
JAMARI NATIONAL FOREST	Federal	RO	Degazettement	1984	2008
TRAIRÃO NATIONAL FOREST	Federal	PA	Degazettement	2006	2006
RIO NEGRO SETOR SUL STATE PARK	State	AM	Downgrading	1995	2010
SERRA RICARDO FRANCO STATE PARK	State	MT	Downsizing	1997	2004
			Downsizing	1996	2002
AMAZÔNIA NATIONAL PARK	Federal	AM, PA	Downsizing	1974	2006
SERRA DO PARDO NATIONAL PARK	Federal	PA	Downsizing	2005	2006
JAMANXIM NATIONAL PARK	Federal	PA	Degazettement	2006	2006
RIO NOVO NATIONAL PARK	Federal	PA	Degazettement	2006	2006
CAMPOS AMAZÔNICOS NATIONAL PARK	Federal	AM, RO, MT	Degazettement	2006	2008
			Degazettement	2006	2008
MONTANHAS DO TUMUCUMAQUE NATIONAL PARK	Federal	AP, PA	Degazettement	2002	2013
GURUPI BIOLOGICAL RESERVE	Federal	MA	Degazettement	1961	2013
NASCENTES SERRA DO CACHIMBO BIOLOGICAL RESERVE	Federal	PA	Downgrading	2005	2009
RENASCER EXTRACTIVE RESERVE	Federal	PA	Downsizing	2009	2013
RIO OURO PRETO EXTRACTIVE RESERVE	Federal	RO	Downsizing	1990	2007
			Downsizing	1990	2000

Figure 3. Protected areas with proposed PADDD events according to WWF-Brazil (2019).

Source: Adapted from the report “PADDD Trends in Brazilian Amazon Potected Areaas — Mapping the risk of protected area downgrade, resize and degazettement in the biome”, produced by WWF Brazil in 2019.

In the figure above, we can see that of the 23 proposed PADDD events, 20 occurred in Conservation Units under the responsibility of the federal government, against only three

PADDD events that occurred in Conservation Units under the responsibility of the state governments.

Also according to WWF - Brasil, as stated in the above mentioned platform, the main causes for the occurrence of PADDD in the country were the following: a) public infrastructure projects; b) land sought for housing in rural areas; c) land areas claimed for local residents; d) legal entitlement for agricultural operations on an industrial or semi-industrial scale; and e) subsistence activities.

Infrastructure	Transportation	PA proximity or overlap with projects to develop/expand roads, railways, hidroways, airports, ports and terminals
	Power generation	PA proximity or overlap with projects of power generation, distribution or transmission
	Agriculture	Occurrence of agriculture and cattle raising activities inside or close to PAs
Land use	Deforestation	Deforestation inside or close to PAs
	Mining	Mining claims inside or close to Pas
	Rural Registryl	Overlap of rural environmental registries with Pas
	Land tenure	PA land tenure status
PA Effectiveness	PA Consolidation	Existence of legal and administrative tools to PA management & PA management effectiveness assessment (RAPPAM)

Figure 4. Table with PADDD trend mapping indicators.

Source: Adapted from the report “PADDD Trends in Brazilian Amazon Potected Areaas — Mapping the risk of protected area downgrade, resize and degazettement in the biome”, produced by WWF Brazil in 2019.

In the table above, we note that the main indicators of trends in PADDD-type events are public infrastructure, especially that related to the expansion of the road network and the production, transmission and distribution of energy, as well as land use, whether for agriculture, deforestation or mining. The effectiveness of the creation of the protected area is also a tendency for events of downgrading, resizing or declassification of protected areas, because land tenure and the consolidation of a protected area are influential factors in the occurrence rates of actions of this nature.

a) Public Infrastructure

In relation to public infrastructure, we can affirm that this cause of PADDD events is mainly related to transportation and energy generation, considering that the expansion of the road network (roads, railroads, waterways, airports, ports and terminals) or the expansion of projects for generation, distribution or transmission of energy are located near or even overlapping protected areas.

In the Amazon, about 110 Conservation Units are in the sights of infrastructure projects, which corresponds to an area of approximately 30 thousand square kilometers in the states of Pará and Amazonas. The National Logistics Plan (PNL), which was under consultation until March 2018,

and which foresees investments in this area until the year 2025, 80 Conservation Units will be affected by the expansion of roads, seven by railroads and 28 Conservation Units by the expansion of the waterway network, all located in the Amazon biome. Five will be affected by roads and railroads concurrently, and nine will be within the areas of influence of roads and waterways. (WWF - Brazil, 2019, p. 16).

Name	Level	State	Total Area (sq km)	“Area of Influence of Roads (sq km)”	“Area of Influence of Roads (%)”
Sustainable Use					
Trombetas State Forest	State	PA	31,436	2,888.3	9%
Reentrâncias Maranhenses Environmental Protection Area	State	MA	10,854.3	2,005.3	18%
Amapá State Forest	State	AP	23,703.4	1,304.5	6%
Baixada Maranhense Environmental Protection Area	State	MA	17,105.6	1,223.4	7%
Igapó-Açu Sustainable Development Reserve	State	AM	3,946.3	995.4	25%
Tapajós National Forest	Federal	PA	5,306.3	947	18%
Integral Protection					
Pico Da Neblina National Park	Federal	AM	22,506.4	1,288.4	6%
Montanhas Do Tumucumaque National Park	Federal	AP, PA	38,647.4	1,092.5	3%
Grão Pará Ecological Station	State	PA	42,024.4	836.9	2%
Jamanxim National Park	Federal	PA	8,629	804.4	9%

Figure 5. CUs affected by road construction, according to the National Logistics Plan 2018.

Source: Adapted from the report “PADDD Trends in Brazilian Amazon Protected Areas — Mapping the risk of protected area downgrade, resize and degazettement in the biome”, produced by WWF Brazil in 2019.

The federal Conservation Units most affected by roads, according to the PNL 2025 Scenario, with data for 2018, in absolute terms, are the following: i) Sustainable Use UC Tapajós National Forest (PA); ii) Full Protection UC Pico da Neblina National Park (SOU); iii) Tucumaque Mountains National Park (AP, PA); and iv) Jamanxim National Park (PA). The total area of these PAs is 75,089.1 km², with approximately 4,132.3 km², or 5.5% of the total area, being under the influence of roads.

Area of Area of

Name	Level	State	Total Area (km ²)	Influence of Railroads (km ²)	Influence of Railroads (%)
Sustainable Use					
Baixada Maranhense Environmental Protection Area	State	MA	17.105,6	856,8	5%
Carajás National Forest	Federal	PA	3.912,6	206,8	5%
Igarapé Gelado Environmental Protection Area	Federal	PA	232,9	75,5	32%
Região Do Maracanã Environmental Protection Area	State	MA	21,9	21,9	100%
Integral Protection					
Jamaxim National Park	Federal	PA	8.629	819,2	9%
Nascentes Serra Do Cachimbo Biological Reserve	Federal	PA	3.422	66,3	2%
Bacanga State Park	State	MA	31,7	31,7	100%

Figure 6. CUs affected by railroad construction, according to the National Logistics Plan 2018.

Source: Adapted from the report “PADDD Trends in Brazilian Amazon Protected Areas — Mapping the risk of protected area downgrade, resize and degazettement in the biome”, produced by WWF Brazil in 2019.

Regarding the federal CUs potentially affected by railroads, in absolute terms according to PNL 2025, with data for 2018, the most affected were the following: i) Sustainable Use CU Floresta Nacional de Carajás (PA); ii) Sustainable Use CU Área de Proteção Ambiental do Igarapé Gelado (PA); iii) Full Protection CU Parque Nacional de Jamanxim (PA); and iv) Full Protection CU Reserva Biológica Nascentes Serra do Cachimbo (PA). These UC's have a total area of 16,196.5 km², and about 1,167.8 km², or approximately 7.2% of the total area, is under the influence of railroads.

Name	Level	State	Total Area (km ²)	Area of Influence of Waterways (km ²)	Area of Influence of Waterways (%)
Sustainable Use					
Mamirauá Sustainable Development Reserve	State	AM	13,199.5	436.8	3.3%
Lago De Tucuruí Environmental Protection Area	State	PA	5,682.1	248.1	4.4%
Marajó Archipelago Environmental Protection Area	State	PA	45,164.4	172.1	0.4%
Humaitá National Forest	Federal	AM	4,731.6	51	1.1%
Gurupá-Melgaço Extractive Reserve	Federal	PA	1,454.2	33.8	2.3%
Pucuruí - Ararão Sustainable Development Reserve	State	PA	291.7	19.6	6.7%
Rio Madeira Sustainable Development Reserve	State	AM	2,796.4	18.9	0.7%
Integral Protection					
Anavilhanas National Park	Federal	AM	3,502.4	267.6	7.6%
Jaú National Park	Federal	AM	23,673.6	70	0.3%
Jutaí-Solimões Ecological Station	Federal	AM	2,895.2	24.8	0.9%

Figure 7. CUs affected by waterway construction, according to the National Logistics Plan 2018.

Source: Adapted from the report “PADDD Trends in Brazilian Amazon Protected Areas — Mapping the risk of protected area downgrade, resize and degazettement in the biome”, produced by WWF Brazil in 2019.

Regarding the federal UCs whose areas are under the influence of waterways, in the figure above we can see that they are the following: i) UC of Sustainable Use Humatá National Forest (SOU); ii) UC of Sustainable Use Gurupá-melgaço Extractive Reserve (PA); iii) UC of Full Protection Anavilhanas National Park (SOU); iv) UC of Full Protection Jaú National Park (SOU); and v) UC of Full Protection Jutaí-Solimões Ecological Station (SOU). Together, the areas of these UC's total 36,257 km², and are influenced by waterways in about 447.2 km², or approximately 1.23% of the total.

When it comes to energy generation, also including in this topic the distribution and transmission network expansions, according to the WWF - Brazil organization, the Ten Year Energy Plan 2026, which shows the energy sector expansion perspectives for the near future, such projects will have direct impacts on 14 UC's and their respective area of influence, these

impacts being related to the construction of two small hydroelectric plants (PCH) and 12 caused by the construction of planned hydroelectric plants (UHE).

Name	Level	State	Total Area (km ²)	Area Affected by HPP (km ²)	Area Affected by SHP (km ²)	Area Affected by HPP or SHP (km ²)
Sustainable Use						
Itaituba II National Forest	Federal	PA	3.977,6	292,3	–	7,3%
Rio Preto-Jacundá Extractive Reserve	State	RO	1.013,6	103,3	–	10,2%
Itaituba I National Forest	Federal	PA	2.131,1	55	–	2,6%
Iquiri National Forest	Federal	AM	14.726,1	–	40,6	0,3%
Aripuanã National Forest	Federal	AM	7.513	25,1	–	0,3%
Floresta Nacional De Tapajós	Federal	PA	5.306,3	947	18%	
Integral Protection						
Jamanxim National Park	Federal	PA	8.629	598,8	–	6,9%
Jaruena National Park	Federal	AM, MT	19.580,2	308,4	–	1,6%
Campos Amazônicos National Park	Federal	AM, RO, MT	9.613,3	271	–	2,8%
Igarapés Do Jaruaena State Park	State	MT	2.238,9	218,8	–	9,8%
Amazônia National Park	Federal	AM, PA	10.662,1	44	–	0,4%

Figure 8. CUs most affected by HPP and SHP projects, in absolute terms (square kilometers), based on data from CNUC and the Decennial Energy Plan 2026.

Source: Adapted from the report “PADDD Trends in Brazilian Amazon Protected Areas — Mapping the risk of protected area downgrade, resize and degazettement in the biome”, produced by WWF Brazil in 2019.

The federal PAs potentially most affected by HPP and SHP projects, in absolute terms, are the following: (i) Sustainable Use UC Floresta Nacional de Itaituba II (PA); (ii) Sustainable Use UC Itaituba I Floresta Nacional (PA); (iii) Sustainable Use UC Floresta Nacional de Iquiri (SOU); (iv) Sustainable Use UC Floresta Nacional Aripuanã (SOU); (v) Sustainable Use UC Floresta Nacional de Tapajós (PA); (vi) Full Protection UC Jamanxim National Park (PA); (vii) Full Protection UC Jaruaena National Park (AM, MT); (viii) Full Protection UC Campos Amazônicos National Park (AM, RO, MT); and (ix) Full Protection UC Amazon National Park (AM, PA). These nine conservation units together have an area of approximately 82,138.7 km², of which 2,582.2 km² are affected by HPP and PCH.

Infrastructure projects can also give rise to new threats to conservation, such as deforestation, increased poaching, increase in illegal settlements, etc., not to mention that during the discussion of PADDD proposals for infrastructure projects, other UCs are added to these processes as bargaining chips where there are diffuse economic and/or political interests. (WWF-Brazil, 2019, p. 22-23).

Name	Level	State	Total Area (km ²)	Deforested Area (km ²)	Deforested Area (%)
Sustainable Use					
Baixada Maranhense Environmental Protection Area	State	MA	17,105.6	8,348.2	48.8%
Reentrâncias Maranhenses Environmental Protection Area	State	MA	10,854	6,666.1	61.4%
Triunfo Do Xingu Environmental Protection Area	State	PA	16,796.5	5,392.2	32.1%
Lago De Tucuruí Environmental Protection Area	State	PA	5,682.1	1,812.6	31.9%
Jamanxim National Forest	Federal	PA	13,017	1,619.1	12.4%
Marajó Archipelago Environmental Protection Area	State	PA	45,164.4	1,495.4	3.3%
Jaci-Paraná Extractive Reserve	State	RO	1,974.4	984.7	49.9%
Tapajós Environmental Protection Area	Federal	PA	20,403.3	934.6	4.6%
Margem Direita Do Rio Negro Environmental Protection Area	State	AM	4,617.5	690.4	15%
Integral Protection					
Gurupi Extractive Reserve	Federal	MA	2,712	798.7	29.4%

Figure 9. The ten most deforested PAs, in absolute terms (square kilometers), 2017.

Source: Adapted from the report “PADDD Trends in Brazilian Amazon Protected Areas — Mapping the risk of protected area downgrade, resize and degazettement in the biome”, produced by WWF Brazil in 2019.

The UCs suffer from the devastating effects of deforestation, a fact corroborated by annual data from Prodes in 2017, which identified that 18 UCs had more than half of their area affected by this event. The Federal UC of Sustainable Use Extractive Reserve of Quilombo do Frechal and the Federal UC of Full Protection Extractive Reserve of Gurupi, both located in the State of Maranhão, had about 8,348.2 km² and 798.7 km² of area deforested, respectively, which corresponds to 48.8% and 29.4% of their total areas. Among the ten most deforested UCs, according to the table above, three are under the responsibility of the federal government, namely the Sustainable Use UC Jamanxim National Forest (PA), the Sustainable Use UC Tapajós Environmental Protection Area (PA), and the Full Protection UC Gurupi Extractive Reserve. These UC's have a total area, together, of 36,132.3 km², however, 3,352.4 km² have been deforested, or 9.28% of the total.

b) Land Use

Agricultural activities can also lead to the occurrence of PADDD events, because although such activities are allowed in the management plans of the UC's of Environmental Protection Areas (APA), and in Areas of Relevant Ecological Interest (ARIE), it is the great frequency with which agricultural activities are developed within protected areas, causing deforestation of conservation areas, that has worried environmental scholars.

According to the organization WWF-Brazil (2019), which used data made available by TerraClass (2014) to assess land use for grazing in the Amazon biome, as a result, “considering the percentage of grazing in relation to the total area of individual PAs, the increase in the number of grazing activities within PAs refers mainly to Sustainable Use PAs, especially APAs

and state forests in the states of Rondônia, Acre and Pará.”

Name	Level	State	Total Area (km ²)	Grazing Area (km ²)	Grazing Area (%)
Sustainable Use					
Baixada Maranhense Environmental Protection Area	State	MA	17,105.6	3,188.9	18.6%
Triunfo Do Xingu Environmental Protection Area	State	PA	16,796.5	3,080.3	18.3%
Reentrâncias Maranhenses Environmental Protection Area	State	MA	10,854.3	892.6	8.2%
Jamanxim National Forest	Federal	PA	13,017.0	857.6	6.6%
Lago De Tucuruí Environmental Protection Area	State	PA	5,682.1	746.6	13.1%
Jaci-Paraná Extractive Reserve	State	RO	1,974.4	332.9	16.9%
Tapajós Environmental Protection Area	Federal	PA	20,403.3	214.3	1.1%
Integral Protection					
Terra Do Meio Ecological Station	Federal	PA	33,731.7	252.4	0.7%
Serra Ricardo Franco State Park	State	MT	1,568.4	236.3	15.1%
Gurupi Extractive Reserve	Federal	MA	2,712.0	201.5	7.4%

Figure 10. The PAs most occupied by pasture, in absolute terms (square kilometers), including all management types, 2014.

Source: Adapted from the report “PADDD Trends in Brazilian Amazon Protected Areas — Mapping the risk of protected area downgrade, resize and degazettement in the biome”, produced by WWF Brazil in 2019.

The federal UCs most occupied by pasture, in absolute terms, according to the PNL 2025 Scenario, 2014, are the Sustainable Use UC Jamanxim National Forest (PA), the Sustainable Use UC Área de Proteção Ambiental Tapajós (PA), the Full Protection UC Estação Ecológica Terra do Meio (PA) and the Full Protection UC Reserva Extrativa de Gurupi (MA). Together they correspond to an area of 69,867 km², of which 1,525.8 km², or approximately 2.18% are affected by pasture.

Mining activity is another cause of PADDD events in Brazil. In 2018, a study entitled “Mining and Protected Areas in the Brazilian Amazon” was conducted by WWF-Brazil, which suggested that 219 PAs have part of their area affected by mining activities and that, according to the National Mining Agency (ANM), they are active. According to WWF-Brazil (2019, p. 28), mining activities are totally prohibited in 118 of these 219 UCs, and, according to the study, the Full Protection UC potentially most affected by mining processes in different stages is the Monte Roraima National Park (RR), with 477 square kilometers affected, followed by the Jamanxim and Serra do Pardo National Parks, both in Pará, and the justification for ranking the UCs most threatened by mining considered the total number of hectares in the area covered by mining activities that overlapped the UC area.

Applications for mining activities within the UCs that have a mining ban cover a total of 295 thousand hectares. Applications for mineral exploration licenses cover an area of just over 90 thousand hectares. The risk area of requests for granting mineral extraction rights covers 16,000

hectares in the Legal Amazon (WWF-Brazil, 2019, p. 28).

Name	Level	State	Total Area (ha)	Mining Area (ha)	Mining Area (%)
Sustainable Use					
Rio Cajari Extractive Reserve	Federal	AP	532,475.1	28,746.8	5.4%
Integral Protection					
Guajará Mirim State Park	State	RO	212,139.8	260,113.5	12.3%
Monte Roraima National Park	Federal	RR	117,673.2	47,664.7	40.5%
Jamanxim National Park	Federal	PA	871,381.7	34,872.7	4%
Serra Do Pardo National Park	Federal	PA	449,980.1	30,303.2	6.7%
Acari National Park	Federal	AM	907,124.1	30,076.6	3.3%
Maicuru Biological Reserve	State	PA	1,151,761	15,493.2	1.3%
Jaru Biological Reserve	Federal	RO	357,231.3	14,005.7	3.9%
Mapinguari National Park	Federal	RO	1,816,518.1	13,229.4	0.7%
Amazônia National Park	Federal	PA	1,072,531.6	10,512.9	1%

Figure 11. Strict Protection PAs most threatened by mining activities in absolute terms (ha) and list of Sustainable Use PAs where mining is not allowed (RPPN, RDS and Resex) that have some mining activity, 2018.

Source: Adapted from the report “PADDD Trends in Brazilian Amazon Protected Areas — Mapping the risk of protected area downgrade, resize and degazettement in the biome”, produced by WWF Brazil in 2019.

In absolute terms, the UCs most threatened by mining activities are the following: a) Sustainable Use UC Extractive Reserve of Rio Cajari (PA); and b) Full Protection UCs Parque Nacional do Monte Roraima (RR), Parque Nacional de Jamanxim (PA), Parque Nacional da Serra do Pardo (PA), Parque Nacional de Acari (SO), Reserva Biológica de Maicuru (RO), Parque Nacional de Mapinguari (RO) and Parque Nacional da Amazônia (PA). These PAs together have a territorial extension of 61,249.2 km², but 2,094.1 km², or 3.4%.

Another event causing PADDD events is the overlap of Conservation Units with the rural environmental registry. In 29 UCs, declared properties (through the Rural Environmental Registry - CAR) and UCs totally overlap (100% of the area of the UC). Of these, 28 are Sustainable Use UCs (extractive reserves and forests) and one is a Full Protection UC (Charapucu State Park, in Pará). Another 22 UCs have more than 90% of their land overlapped with properties declared in the CAR, of which 20 are Sustainable Use UCs (extractive reserves and forests) and two are Full Protection UCs (Xingu State Park and Rio Flor do Prado Ecological Station, both in Mato Grosso). (WWF - Brazil, 2019, p. 31).

Among the Sustainable Use UCs - forests and extractive reserves - 53 UCs have more than half of their properties overlapped (CAR) at both the federal and state levels, especially those located in Amazonas and Rondônia. Considering the percentage of area affected and the size of the area in absolute terms, among the ten most affected UCs, eight are located in Amazonas. Outside of the Full Protection UCs, there are properties registered in more than half of the area of six UCs. (WWF - Brazil, 2019, p. 31).

c) Effectiveness of a protected area (PA) management

According to a study developed by WWF - Brazil in 2019, which shows the trends of PADD occurrence in the Brazilian Amazon forest, and according to data from the Ministry of Environment, 54% of the PAs in the Amazon biome have management councils and only 26% have a management plan.

The document also states that, in addition, there is no data available on the performance of the councils or the applicability of the plans to the management of the UCs. According to CNUC, 68% of the UCs in the Amazon have not informed their landholding status to the Ministry of Environment, and only 11% have informed that the UC is in compliance. In other words, only 36 UCs have land regularization status - 17 Sustainable Use UCs and 19 Strict Protection UCs (WWF - Brazil, 2019, p. 33).

Finally, the authors of the study say that having a management plan and a functioning council should be the starting point for all PAs to fulfill their purposes, although there is no guarantee that this will prevent them from being the target of a PADD process. In the absence of any of these mechanisms, however, the PAs will be even more vulnerable in terms of their implementation and management, therefore, to PADD events (WWF-Brazil, 2019, p. 33).

But how can the public authorities and organized society act to minimize or even prevent PADD events from occurring in the existing Conservation Units in Brazil?

To this question, the document produced by WWF-Brazil states that

“it is important to act in a concerted and preventive manner and to accompany the issues under discussion in the National Congress, in the state legislatures, and in some segments of the Brazilian economy. To do so, it is first fundamental to understand the factors at play that lead to PADD events and map the future trends of this process. It is also fundamental to establish mechanisms or instruments to capture data, anticipate conflicting situations, and also propose preventive solutions and innovative approaches for PAs.”

The same study brings some more specific recommendations so that the areas preserved by the state and federal governments do not suffer with the reduction of their areas, or even extinction, as follows:

- Promote the strategic environmental assessment of large planned projects as recommended by the Federal Audit Court (Decision No. 464/2004), to support a systemic, comprehensive, and cumulative analysis of the investment proposals;
- Outline and implement formal steps to discuss the PADD proposals. This should be based on transparency, scientific-technical support and stakeholder consultation. This could be similar to the process in place for creating PAs;
- The information about management plans, zoning perimeters and UCs must always be updated and publicly available to avoid triggering deforestation, land grabbing, mining activities due to lack or insufficient information;

-Progress should be made in researching the ecological, social and economic consequences of PADDD events, particularly prior to their enactment.

These recommendations are mainly aimed at improving the stages of the process of creating Conservation Units, as well as a better discussion about the proposal of PADDD type events, so that no harm is done to the environment or to society.

As many fundamental questions about PADDD remain unanswered, more research is needed to understand this conservation phenomenon and develop tailored policy responses. The PADDD challenges long-standing assumptions underlying conservation policies and practices, including efforts to reduce deforestation and forest degradation (REDD), and underscores the need for resilient and robust conservation strategies (Mascia and Pailler, 2010, p. 9).

Whereas Pack et al (2016, p. 1), he suggests the need for national policies governing PADDD that are analogous to policies governing the initial establishment of PAs, including public consultation, technical studies, compensatory measures, and visual representation and explanation of proposed changes.

3. Methodology

One of the best concepts of methodology is the one that says that this term can be understood as the paths to be taken in order to carry out a research or a study, or, in other terms, to do science. The term, etymologically speaking, refers to the study of the paths, of the instruments used to do scientific research.

Thus, given the importance of methodology to do science, it is imperative to differentiate it from what is method. Thus, one can say that the first term is interested in the validity of the path chosen to reach the end proposed by the research; therefore, it should not be confused with the content (theory) or with the procedures (methods and techniques). Thus, methodology goes beyond the description of procedures (methods and techniques to be used in the research), indicating the theoretical choice made by the researcher to approach the object of study.

In view of the above, to reach the objective proposed in this simple article, the methods to be used will be the following: (a) qualitative - which can be considered as a research approach that studies subjective aspects of social phenomena and human behavior, having as objects of a research the phenomena that occur in a certain time, place and culture; (b) quantitative - given that such types of data include details and can also provide a more human perspective to the research results; and c) inductive, which allows us to verify, based on data collected from Science Magazine, the WWF- Brazil Institute, and the Instituto Socioambiental, the quantitative impact of the events of downgrading, resizing, and reclassification of protected areas under the governance of the federal government in Brazil since 2008.

As for the purposes, the research is characterized as descriptive and explanatory, because it will try to conduct an analysis of events of downgrading, resizing and reclassification of federal protected areas in Brazil, correlating variables related to the nature areas under federal state protection, so that one can determine the causes that leads to the occurrence of this type of event called PADDD, as well as the direct effects on the national policy of creation of Nature

ConservationUnits.

For Gil (2002), the descriptive research has as its primary objective the description of the characteristics of a certain population or phenomenon, or the establishment of relations between variables, and there are many studies that can be classified under this title, having as one of its most significant characteristics the use of standardized techniques for data collection, such as the questionnaire and systemic observation. The explanatory research, on the other hand, according to the same author, would have as its central concern to identify the factors that determine or contribute to the occurrence of phenomena, and can be considered the type of research that deepens the knowledge of reality, because it tries to explain the reason, the why of things, which makes it the most complex and delicate type of research, since the risk of making mistakes increases considerably.

According to Gil (2002), the main advantage of this type of research is that it allows the researcher to cover a much wider range of phenomena than he could research directly.

To obtain the data, a search was conducted on the website of the Instituto Sociambiental, on the website of WWF-Brazil, and on the website of the international journal Science. This information, collected in the form of tables and graphs, will be analyzed and discussed in order to achieve the objectives pursued in this work.

4. Results and Discussions

In the year 2018, according to TABLE 01, there were in Brazil about 336 Conservation Units under the governance of the Federal Government that corresponded to an area of 166,186,025 ha, or 1,661,860.25 sq km, equivalent to 19.5% of the national territory.

The National Parks and the National Forests are the most common types of Federal Conservation Units, with 74 and 67 units, respectively. In the case of the division of the Conservation Units into Sustainable Use Units and Full Protection Units, the State of the Federation that has the most Sustainable Use Federal Units is Pará, with 38 units, while the State of Bahia has 21 Full Protection Federal Units, being the State that has the most preservation areas of this type. The State of Amazonas has 24 Federal Sustainable Use Units and 16 Federal Full Protection Units.

From the standpoint of the biome where the federal UCs are located, of the 366 existing in 2018, there were 87 Sustainable Use UCs in the Amazon and 52 Full Protection UCs in the Atlantic Forest biome.

In Figure 07, adapted from Padd et al. (2016), we notice that in the period from 1900 to 2014, 67 PADD events were enacted and another 60 were proposed, totaling 127 events that affected about 91,494 km² of area. According to WWF-Brazil (2019), in March 2018, of the 23 events of downgrading, resizing and reclassification of protected areas, events known as PADD, 20 were to occur in Federal Conservation Units.

According to a study published in 2019 by WWF-Brazil, the PADD event that had the most occurrences was the reduction of preservation units, with 43 such events being proposed in 2014, being 15 active and 12 inactive. The Amazon biome had the most occurrences of PADD

events, with 48 enacted, 10 active and 19 inactive in 2014.

The main primary causes of these events would be the expansion of the country's road infrastructure through the construction of roads, railroads and waterways. These works would influence, respectively, 4,132.3 km², 1,167.8 km², and 447.2 km² of federal protected areas, totaling 5,747.3 km².

The expansion of hydroelectric infrastructure (production system, distribution and transmission of energy) also influences the occurrence of PADDD events in nature conservation areas under the responsibility of the federal government. In 2014, 26 PADDD events were enacted, with only one being active and another inactive. According to WWF-Brazil (2019), this type of investment affected 2,582.2 km².

Deforestation also influenced the downgrading, resizing, and declassification of federally protected areas, given that there was the suppression of green area illegally in 3,352.4 km² belonging to Conservation Units according to WWF-Brazil (2019). The expansion of pasture areas affected 1,525.8 km² of federal protection areas also according to the institute still little mentioned.

In the case of mining, it affected about 2,094.1 km² of Conservation Units under federal responsibility.

Table 1. Conservation Unit areas affected and/or influenced by PADDD trends

PADDD TREND	INFLUENCED AND/OR AFFECTED AREA (km²)
Road construction	4.132,30
Railroad construction	1.167,80
Construction of waterways	447,2
Energy production, distribution and transmission	2.582,20
Deforestation	3.352,40
Pastures	1.525,80
Mining	2.094,10
TOTAL	15.301,80

Source: Own elaboration from WWF - Brazil data (2019).

In TABLE 01 above, we can infer that the PADDD trends present in the study prepared by WWF-Brazil (2019) provoked alterations and/or influenced around 15,301.8 km² of Conservation Unit areas under the responsibility of the federal government, both those classified as Sustainable Use and those of the Full Protection type. This value corresponds to approximately 0.9% of the total 1,661,860.25 sq km of federal Conservation Units.

5. Conclusions

The creation of the National System of Conservation Units through Federal Law 9.985 on July 18, 2000, which regulated art. 225, § 1, clauses I, II, III, and VII of the Federal Constitution, and established the National System of Nature Conservation Units and other provisions, was a

major advance in the country's defense and preservation of large green areas, especially in regions where there are remnants of Atlantic Forest and Amazon Rainforest vegetation.

However, the development of Brazil has required changes in the Conservation Units instituted by the Federal Government, which, in 2018, corresponded to 19.5% of the entire Brazilian territory. These changes occurred through events called PADD, events that cause the downgrading, resizing, and reclassification of protected areas, both of the Sustainable Use UC type and the Full Protection UC type, in addition to reducing the “useful” life of UCs by only 15 years, counted from their enactment to their extinction.

The occurrences of the PADD event had an increase in its incidence mainly as of 2008, and in 2014, had already reached 0.9%, of the areas destined to the Federal Conservation Units, which corresponds to 15,301.80 km². The primary reason for these reduction events was the investments in the expansion of the hydroelectric infrastructure.

Thus, the suggestions made by the WWF - Brasil researchers published in the report “Trends of the PADD in the Protected Areas of the Brazilian Amazon - Mapping the risk of downsizing, resizing and declassification of protected areas in the biome”, in order to minimize the harmful effects of these events on the environment, should receive considerable attention from government agencies, both at the federal and state levels.

For the WWF-Brazil institution, the strategic environmental assessment of large projects should be promoted, following the recommendation issued by the Federal Court of Audit, in Decision No. 464/2004, so that this environmental assessment may subsidize a systemic, comprehensive and cumulative analysis of the investment proposals. Formal steps must also be outlined and implemented so that the proposals for the creation of PADD type events can be better discussed, so that their enactment is based on transparency, technical-scientific support and consultation with stakeholders.

The third suggestion is that the information about management plans, zoning perimeters and PAs should always be updated and publicly available to avoid triggering deforestation, land grabbing, mining activities due to lack or insufficient information.

Last, and not least, WWF-Brazil suggests that progress should be made in researching the ecological, social and economic consequences of PADD events, particularly prior to their enactment.

In other work that has examined the topic discussed here, Pack et al. (2016, p. 1) suggests the need for national policies governing PADD that are analogous to policies governing the initial establishment of PAs, including public consultation, technical studies, compensatory measures, and visual representation and explanation of proposed changes.

In the specific case of this work, it was not intended to exhaust the discussion on nature protection areas, but to contribute through a contemporary quantitative analysis of the impacts of PADD type events in the preservation areas under federal governance, so that more research and studies are promoted by the scientific community with the objective of subsidizing public policies to combat the promulgation of “PADD” type events, which may diminish or

even extinguish the already existing areas of environmental preservation, creating at the very least, mechanisms of economic compensation for the damage caused to society and the environment.

And these researches and studies should be encouraged or, at least, have Brazil as a target, considering that, as we have seen with the data discussed here, we are important territorially and populationally speaking, and we have a great influence on the world scene when it comes to environmental legislation and the creation of areas of protection of natural resources, thus, any attitude we take in relation to the preservation of our environment, can influence the way in which other nations also began to treat their natural areas. Therefore, every care is too little with regard to what we intend to leave as an inheritance, in terms of natural resources, to future generations.

5. Acknowledgement

To Gilles Fontgalland, neuroscience student at Ohio State University – USA, for all contribution in regard of the success of this paper.

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